ARIZONA KINDERGARTEN READINESS STUDY

FIRST THINGS FIRST EXTERNAL EVALUATION

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THE ARIZONA KINDERGARTEN READINESS STUDY (AKRS) EXECUTIVE SUMMARY

This report describes the methodology and findings of the Arizona Kindergarten Readiness Study (AKRS), conducted by the First Things First External Evaluation (FTFEE), a tri-university research consortium (University of Arizona, Arizona State University, and Northern Arizona University). This study is the first of three "snapshots" of approximately 1,200 randomly selected entering kindergartners across the state to be conducted every other year beginning in 2009.

The purpose of AKRS is to assess changes in Arizona's beginning kindergartners in the domains of physical health and well-being, social and emotional development, approaches to learning, language and literacy development and cognition and general knowledge. This "snapshot" is designed to capture any overall statewide change in children's readiness for kindergarten. Below we report baseline information regarding school readiness of kindergarten children prior the full roll out of comprehensive early childhood education programs have been disseminated throughout Arizona.

Project Design

AKRS included 82 randomly drawn public, including charter, and private schools throughout Arizona. The distribution of schools was similar to that of the universe of Arizona's schools offering kindergarten in fall 2009. Data were collected from 1145 first time kindergartners (average age 5 years 8 months), their teachers and guardians between August and December 2009.

Trained assessors administered direct child measures at the school site in a classroom separate from the child's primary classroom to reduce intrusion upon regular instruction. Assessments included height and weight, the motor development subset of the *Battelle Developmental Inventory, Screening Test (BDI)*; the *Preschool Language Sale Fourth Edition* (PLS-4), the *Phonological Assessment of Literacy Screening (PALS),* and the *Research-based Early Mathematics Assessment (REMA).*

In addition, to the direct child measures questionnaires were distributed to both parents/guardians

and teachers of the participating children. The parent report was a two-part, 85-question survey: Part A focused on parent/family demographics, kindergarten transition experiences, and participation in family/child support services. Part B included a 3-point rating (proficient, in progress, not yet) of children's development in the domains of social, physical, language/literacy, and mathematics.

Teachers completed a parallel two-part, 63-question survey. Part A focused upon professional their own professional experiences, classroom size, ethnic distribution of students, and school demographics. Part B included both demographic information for each child rated and the same 3-point rating scale used for guardians regarding each children's classroom performance on activities and abilities in the domains of socio–emotional, physical, language/literacy, and mathematics development.

Summary of Key Findings

Beginning Kindergartners and Their Families

- 51% of the children were non-Hispanic; 49% were Hispanic
- 48.7% of the children were females and 51.3% were males.
- Average age at assessment was 5 years 8 months
- 5.5% of the children were on an Individualized Education Plan.
- A little over half of the children were receiving free or reduced-price lunch.
- Nearly 74% of children had attended an early care and education program prior to kindergarten.
- Guardians in the study were distributed as follows, 74% mothers, 27% fathers, 4% other. These sum to greater than 100% due to some parents/guardians marking multiple roles).
- Approximately 31% of guardians had a high school diploma or less, 38% had some college or an associate's degree and 31% had a bachelor's degree or higher.
- 72% of guardians were married, 6% divorced, 4% separated and 1% was widowed.
- English was the home language for most of the families (76.7%), 21.5% reported Spanish as their home language, and 1.8% listed a primary language other than English or Spanish.

Physical-Health and Well-being

- 86.1% of first-time kindergartners were in very good or excellent health.
- 90.9% of the children had access to health insurance and 87.9% had access to dental insurance.
- 94.6% of the children had received a well-child check up in the year prior to kindergarten entry.
- 88.7% of the children had visited the dentist in the 12 months preceding the study.
- 9.6% of the children had never seen a dentist at the time of assessment.

- Gum and teeth problems were the most common health conditions experienced by the children in the study (22.4%).
- 20% of guardians had concerns about their children's learning, development or behavior; 11% of guardians reported concerns about vision or hearing.
- Only 21% of guardians had discussed health concerns with a medical provider or teacher.
- 15% of the children were at risk for being overweight
- 12.9% of children were obese.
- 8.1% of the children had low birth-weight.
- 89.2% of the entering kindergartners had well-developed motor skills.
- The larger the number of health risks children had, the lower their scores on measures of language development, literacy and mathematics proficiency, with the largest influence on language development.

Social Emotional Development

- Overall, most guardians (65.5%) and teachers (89.9%) believe children display positive social and emotional skills that contribute to school success.
- Guardians reported that kindergartners show strengths in controlling anger (83.8%) and cooperating with others (78.7%).
- Teachers reported children's strengths to be listening to and respecting others (70.5%) and sharing (69.7%).
- Guardians and teachers reported that females have better social skills than males.
- Nearly 10% of teachers and 35% of guardians had concerns about their children's behavior.
- Guardians (33.9%) expressed some concerns about children's behavior, particularly short attention span.
- Teachers reported concerns about distractibility (17.1%).
- Social and emotional development had a positive effect on language development, literacy skills, and mathematics, with the largest effects seen in language development.

Approaches to Learning

- Teachers reported that 82% of children in the AKRS study had positive approaches to learning.
- As children's scores on approaches to learning increased, so did their scores on oral language development, alphabet knowledge, print and rhyme awareness, mathematics and motor development.
- Children from families receiving free or reduced lunch prices were most likely to score at the developing level in approaches to learning.

Language and Literacy Development

- The majority of both English (93.3%) and Spanish-speaking (87.6%) kindergartners show normal or above average development in the overall language skills needed to succeed in school.
- Children have more developed expressive language skills than auditory comprehension skills; this was true of both English speaking (95.8%) and Spanish speaking (90.7%) groups of children.

- The strongest predictors of variation in children's language development were approaches to learning, guardian education, and receipt of free and reduced lunch.
- 94.4% of the children in AKRS knew more than 10 upper-case letters of the alphabet; 95.6% new more than 10 lower-case letters.
- 96.1% knew more than 10 beginning letter sounds.
- 97.8% could write their name at kindergarten entry.
- 85% of the children display age-appropriate rhyming skills.
- Most children were able to identify letters (95.5%) and simple words (92.9%) in text and demonstrated an understanding of left to right directionality (90.5%).
- Fewer children could move their finger along a line of print (74.4%) or match spoken and printed words (62.2%).
- 46.2% of guardians read to their children 3-6 times per week.
- Attendance in an early care and education program prior to kindergarten has a positive effect on language and literacy development.

Cognition and General Knowledge

- Attendance in an early care and education program prior to kindergarten has a positive effect on mathematics proficiency.
- Nearly 50% of the children were rated as proficient in early mathematical thinking.
- 85.3% can count up to ten using 1-to-1 correspondence.
- 78.7% of the children correctly identified numerals 1 through 10.
- 84% of the children could identify basic shapes.
- Nearly 83% of entering kindergartners could match and sort objects.
- Only 63% on children in AKRS could describe the attributes of shapes or use measurement terms such as, longer, shorter or heavier to describe objects.
- Nearly 1 in 5 children need support creating simple patterns.

Recommendations

Physical Well-Being and Motor Development

- A little more than one in five children had a history of oral health problems in the AKRS, including dental caries. Very few parents reported their child had received the AAP-recommended first dental visit by 12 months and a little less than a quarter had received a dental by age 2.
    - *Thus, it is important to provide interventions focused on children birth-to-three and their families that aim to prevent oral health problems and establish good oral hygiene.*
- Almost 30% of the entering kindergartners were at risk of being overweight or were already obese.
    - *Therefore, health agencies and schools should promote and facilitate the implementation of structured nutritional and exercise intervention programs as well as education programs aimed at parents to reduce the prevalence of child obesity in the state.*

- Almost one in five (18.7%) parents reported concerns about their child's learning, development or behavior and 11.1% reported concerns about hearing or vision.
    - *To address this delay in recognition, the Center for Disease Control has made several recommendations: a) develop, test and monitor (particularly in primary care) community-based models for conducting developmental screening and providing the needed care; b) increase education of health professionals about the need for screening and how to screen; c) increase general awareness about the need for developmental screening.*

Social Emotional Development

- Teachers (92.2%) and guardians (82.6%) report that the majority of Arizona's first time kindergartners possess the *protective factors* (i.e., strong attachments, initiative, and self control) that will help them to be successful when facing social and academic challenges in school and life. However, several family and economic factors contributed to lower scores in overall social emotional development.
    - *Even though the current economic conditions in Arizona have exacerbated these conditions and severely taxed the resources of state and social service agencies to address the needs of families, every effort should be made to increase access to high quality mental health, social and educational services, both in and out of school to ensure that families have the resources available to support their children's healthy growth.*

Approaches to Learning

- Roughly 17% of children in AKRS were rated by their teachers as *developing* approaches to learning. Children who were still *developing* approaches to learning skills were less likely to be identified by their teachers as learners who display persistence, problem solving, independent decision making, risk taking in learning, and curiosity.
    - *Because children's approaches to learning had significant effects on children's mathematics proficiency and their auditory language development, all teachers of young children, families, and service providers should receive specific training on this domain of development.*
    - *Children should be provided with access to programs (e.g., creative arts and music programs, visits to children's museums, etc.) that encourage persistence, problem solving, independent decision making, curiosity and risk taking in learning.*

Language and Literacy Development

- Kindergartner's expressive language skills were better than their auditory comprehension skills. Activities such as shared book reading, singing songs, and engaging in conversations with children build their auditory comprehension skills. It is recommended that parents read to their young children 3-5 time per week, however, 28.2% of parents in AKRS read to their children 0-2 times per week, this is below national averages.
    - *Thus, families should be provided with programs that encourage culturally relevant literacy activities in the home. Furthermore, educators of young children should be provided with coursework or professional development opportunities focused on enhancing children's auditory comprehension skills.*

- The majority of first-time kindergartners were proficient in the emergent literacy skills necessary for future literacy achievement. However, 1 in 10 children needed additional support learning left to right directionality, and nearly 40% needed additional assistance with matching spoken and printed words.
    - *Support of programs that introduce families and early care and education providers to interactive reading strategies (e.g. dialogic or shared reading) that support children's understanding of print and how it functions are recommended.*

Cognition and General Knowledge.

- Only 50% of the children in AKRS were rated proficient in mathematics. This is concerning given recent research that shows knowledge of basic mathematics skills at kindergarten entry are more predictive of later school success than literacy skills.
    - *A significant investment in the development of young children's mathematical thinking is warranted. Both programs for families, and curricular and materials for caregivers, as well as training opportunities for both groups are necessary to achieve this goal.*

Conclusion

This report describes Arizona's first statewide effort to collect a systematic, uniform set of data related to children's readiness for school. The findings and interpretations from this initial evaluation are for the base-year of First Things First's program operation, prior to any substantial funding distribution throughout the state. In subsequent publications, we look forward to providing more nuanced explanations of the differences in children's readiness for school as discussed in the present report.

THE ARIZONA KINDERGARTEN READINESS STUDY (AKRS)

This report details the methodology (see Appendix A) and findings of the Arizona Kindergarten Readiness Study (AKRS), conducted by the First Things First External Evaluation (FTFEE), a tri-university research consortium from the University of Arizona, Arizona State University, and Northern Arizona University. AKRS is one component of the overall external evaluation[1] of First Things First (FTF), a comprehensive, statewide system of early childhood programs and family support services overseen by the Arizona Early Childhood Development and Health Board.

The purpose of AKRS is to provide a "snapshot" of broad, general changes in school readiness of a representative sample of Arizona's beginning kindergartners. Findings shared in this report represent baseline data collected from a representative sample of approximately 1,200 beginning kindergarten children, their kindergarten teachers and guardians from August to December 2009. Future waves of AKRS will be compared to the findings reported here with the goal of determining how the overall health and readiness of Arizona's beginning kindergartners changes in respect to the roll-out of First Things First funded programs and services.

Organization of the Report. This report is comprised of several sections. Section I describes kindergarten readiness, why it is important, and how readiness was measured for the purposes of this study. Section II of the report describes general characteristics of the schools, teachers, families and children who participated in AKRS. Section III of the report discusses results of children's readiness for school both in aggregate and across several sub-groupings such as, household income level, family structure, ethnicity/race, guardian/guardian education and primary home language. Section IV offers recommendations for addressing some of the variance in children's health and competencies as assessed by AKRS baseline study.

Appendices A and B includes a technical summary of AKRS methodology, including detailed descriptions of each child level measure used in the study and additional tables cited in the text.

SECTION I: WHAT IS KINDERGARTEN READINESS?

There is a national consensus that children's readiness for kindergarten is dependent upon five distinct but interconnected domains of development.[2] These domains include physical well-being and motor development, social and emotional development, approaches to learning, language and literacy development and cognition and general knowledge. While this final area of readiness may be the one that makes most intuitive sense for school readiness, it is important for readers to note that both the National Education Goals Panel (NEGP) and the American Academy of Pediatrics (AAP) [3] caution against using a narrow definition of school readiness based solely on the domain of cognitive development.

Definitions for each domain of children's development assessed in AKRS are presented below. While presented separately for ease of reading, each domain of development interacts with and affects development in another domain. Measuring or providing interventions for one area of development while ignoring another is unlikely to produce an accurate picture of children's preparedness for school or help Arizona meet its desired goal of all children "ready for school and set for life".

Physical Well-Being and Motor Development

Physical well being includes children's rate of growth and physical fitness as well as their overall health. Motor development includes *gross motor skills* such as walking, running, climbing, or throwing a ball and *fine motor skills* include such thing as cutting or writing.

Both physical well-being and motor development are important in their own rights but at first glance, their relationship to kindergarten readiness may not always be apparent. A recent review in the journal *Pediatrics* [4] notes that education and health are tied together and that disparity in one area can contribute to disparities in the other, particularly for poor and minority children. Similarly, recent reports show that fine motor development affects achievement [5] and gross motor development affects participation in physical activities[6] necessary for healthy living and disease prevention.

Social and Emotional Development

Social development refers to children's ability to interact and cooperate with others and the ability to form and sustain relationships. It also relates to personal characteristics such as initiative, self sufficiency, and motivation. *Emotional development* is highly related to social development. It pertains to children's self concept, their ability to express feelings in ways that are acceptable to society, and their ability to comprehend others' emotions and respond appropriately.

Children who are socially and emotionally ready for school generally have improved school outcomes, better odds of later school and vocational success, better later social and emotional development and an easier time developing relationships with their peers.[7] Supporting children's social and emotional development is an investment to society through increased personal achievement and productivity in adulthood.[8]

Approaches to Learning

Approaches to learning is an umbrella term for the different ways in which children engage in the process of learning. Traits associated with "approaches to learning" include such things as curiosity, persistence, imagination, attentiveness, and creativity. Several recent studies show that approaches to learning influences academic performance. For example task completion is associated with academic gains in mathematics in kindergarten[9] and teacher ratings of motivation in kindergarten are predictive of later reading achievement.[10]

Language and Literacy Development

There are few who would argue the importance of language ability in schooling. In all of their various forms, languages are a primary connector between people. However, there are particular aspects of spoken and written language that are of primary importance to longer-term success in school. Two components of oral language development lay

the foundation for school success. *Auditory comprehension* includes skills such as identifying and using sounds to form words, following directions, the ability to retell a story, vocabulary development, and gaining understanding from oral and written communication. *Expressive communication* skills include using language to convey thoughts, ideas, or feelings in a manner that is understandable to others.

Literacy development, learning to read and write, begins in infancy. The National Early Literacy Panel[11] has examined the state of knowledge about young children's language development and found several early literacy skills that are related to later achievement. AKRS investigates those most highly correlated to school success:

- Alphabet Knowledge (knowledge of names and sounds associated with letters)
- Phonological Awareness (awareness of the sounds of language; rhyming)
- Concepts of Print (knowledge of the conventions of print, directionality)
- Writing or name writing

Cognition and General Knowledge

Cognition and general knowledge consists of general knowledge of the world and other cognitive competencies such as *early math skills* (e.g., knowledge of counting, shapes, size or magnitude, and simple patterns), and *problem solving skills* such as understanding similarities and differences and classification.

A long history of cognitive science shows that children learn many things prior to school entry. They learn through relationships with family, peers, and interactions with the environment in which they live. In the past decade, researchers have amassed a significant amount of evidence about young children's mathematical thinking. The importance of early mathematics knowledge is emphasized by a recent study which shows that mastery of early math skills at kindergarten entry is a stronger predicator of future achievement than early literacy ability.[12]

These areas of development, when considered together, are the building blocks of kindergarten readiness. While assessing these domains of readiness as children enter kindergarten can be useful for planning more effective services that prepare children for school, we must not forget

that being ready to learn in kindergarten extends beyond child-specific abilities to the capacity of families, educators and the broader community to support children's development.

WHY IS KINDERGARTEN READINESS IMPORTANT?

A large and growing body of research supports the critical relationship between kindergarten readiness and successful life-long outcomes. The importance of early skills to later economic outcomes is shown through longitudinal studies including the Perry Preschool, [13] the Abecedarian Project,[14] and the Chicago Child Guardian Centers.[15] All of these model programs provided children with the academic, social, health, and family supports known to positively influence children's overall development. Children participating in these comprehensive early childhood programs demonstrate long-term gains in reading and math, socio-emotional development, high school graduation rates and increased earning. They also had fewer teen pregnancies and arrests in adulthood than children without access to similar, comprehensive systems of support.

These types of outcomes are particularly important for Arizona given undesirable performance on both reading and mathematics outcomes as measured by the National Assessment of Education Progress [16] and low national rankings (i.e., 39th in 2010) as measured by national indicators of children's well-being [17] (e.g., child poverty, infant mortality, drop-out rates, teen pregnancy, etc.). When coupled with burgeoning literature on early brain development, these studies underscore the fact that children's future health, well-being, and academic success are grounded in their early experiences. They also highlight the important role that families, schools, and communities play in supporting children's readiness for school.

Being ready to start kindergarten is an important milestone in every child's life; it marks entry into formal education. Children's experiences during this important transition influence how they feel about future educational experiences. Therefore, taking steps to better understand the strengths and needs of Arizona's young children at kindergarten entry will assure that they are prepared for a successful school experience and consequently, a productive life.

Measuring Kindergarten Readiness

Growth is more rapid in the years from birth-5 than at other periods of development. This fact makes assessment of children's skills and abilities at one-point-in-time challenging. To alleviate the challenges and potential bias associated with measuring growth during periods of rapid developmental change, the National Education Goals Panel recommends that assessment of young children rely on multiple informants, including direct assessment, guardian report and teacher ratings. Data collected for AKRS were obtained through each type of measure recommended by the NEGP.

Direct Child Measures

Direct child assessments, administered in the school setting, were selected based on several criteria (see Appendix A for detailed descriptions of assessments): (a) the amount of time the assessment required; (b) cultural sensitivity; (c) age range for which the test had been normed; (d) professional rating of the assessment (recognition in the field); (e) validity; (f) ease of training and assessing inter-rater reliability; (g) engaging for children; and (h) if the assessment was available in Spanish.

The direct child measures used in AKRS include:

- Measures of height and weight;
- The motor development subset of the *Battelle Developmental Inventory, Screening Test (administered in English and Spanish)*
- *Preschool Language Scale* (PLS-4) *(administered in English and Spanish)*;
- The *Phonological Assessment of Literacy Screening (PALS); and*;
- The *Research-based Early Mathematics Assessment (REMA).*

A final consideration in the selection of assessments for use in AKRS was alignment to the knowledge, skills, and abilities outlined by Arizona's Early Learning Standards which provide a framework for early learning experiences for all children 3 to 5 years old.[18] The five domains of development discussed above reflect 5 of the 7 areas included in Arizona's Early Learning Standards.

Guardian and Teacher Reports of Children's Development

Following the recommendations of the NEGP to use multiple informants when assessing child outcomes, both guardians and teachers of the participating children completed a questionnaire related to children's overall well-being and development. While some may worry that teachers are not an appropriate source for assessing their students' abilities, evidence suggests that teachers' judgments about their students are fair and accurate. [19] Teachers interact with their students on a daily basis and their judgments reflect deep knowledge about their students that is constructed over time and across many contexts.[20] In fact, several studies show that teachers' judgments are even better predictors of students' future performance than standardized measures,[21] especially when judging concrete mathematical skills such as counting, number naming and simple computations.[22] [23]

Guardians are also known to judge their children's developmental abilities[24]and health status with reliability.[25] As children's first teachers, guardians possess unique knowledge about their child that is not always clear to others. Because guardians spend more time interacting with their children than other people, their observations should be considered in all evaluations of children's development.

Guardians of participating children were asked to complete a two-part, 85-question survey: Part A of the questionnaire focused on guardian/family demographics, children's health conditions, participation in early care in education programs, kindergarten transition experiences, and participation in family/child support services. Part B included a rating (proficient, in progress, not yet) of children's development in the domains of social and emotional development, physical, language/literacy, and mathematics.

Teachers completed a parallel two-part, 63-question survey with the first part focusing upon professional experiences, classroom size, ethnic distribution, and school demographics. Part B included both demographic information on the children and a rating scale identical to that of the guardians of the child's classroom performance on activities and abilities across socio–emotional, physical, language/literacy, and mathematics domains.

All direct child measures were completed in the school setting by trained assessors. Assessors received 40 hours of training which provided an overview of the purpose of the study, data collection procedures and instruction on protocols for each child level measure. After initial training and content examinations, all assessors were observed by supervisory personnel to determine administration proficiency. Assessor and supervisor scores were compared after the assessment battery was completed and reliability was estimated by inter-rater agreement established at 90%. Guardian and guardian surveys were completed in the school or home.

SECTION II: DEMOGRAPHIC CHARACTERISTICS OF SCHOOLS, TEACHERS, CLASSROOMS, KINDERGARTEN CHILDREN AND FAMILIES

In this section of the report, we provide general demographic information about schools, teachers, families and child participants. First, we describe the schools and teachers who participated in the study. Next we provide a brief description of the kindergarten classrooms in which children were enrolled. We then provide detailed descriptions of the first-time kindergartners and their families. This information provides the basis for understanding similarities and or differences children's health and preparedness for kindergarten entry.

SCHOOL CHARACTERISTICS

Eighty-two schools from 48 districts across the state participated in AKRS (see sampling plan in Appendix A). Three types of schools were represented, public, private, and charter. Following a pattern similar to that of other large-scale studies of kindergarten readiness reference,[26] more children attended public schools (83%) including charter schools (7%), than private schools (10%).

The schools were located in both rural (28%) and urban areas (72%) of the state. The majority of the schools were located in the central area of the state (52%), with fewer located in the northern (16%) and southern regions of the state (32%). The geographic dispersion of schools is similar to that of all schools providing kindergarten in the Arizona in the fall of 2009; 57%, 14%, and 29%, respectively.[27]

TEACHER AND CLASSROOM CHARACTERISTICS

A total of 252 kindergarten teachers participated in the study; 81% completed the demographic information contained in Part A of the teacher questionnaire. Teachers were highly educated, with nearly half (45.8%) possessing a master's degree and 1% holding a doctorate. All teachers were certified to teach in the state of Arizona, with many holding more than one certification. As expected, the majority of the teachers (86.5%) held an Elementary Education Teaching

Certificate. Surprisingly, 81.8% of the teachers held an Early Childhood Teaching Certificate or Endorsement which will be required of all kindergarten teachers in July 2012. Teachers had an average of 10 years of teaching experience, with 7 years at the kindergarten level.

Classroom Characteristics. Arizona provided funding for implementation of voluntary full-day kindergarten programs in 2006-2007 and again in 2008-2009; by the fall of 2009 districts were required to fund these programs without assistance from the state and most maintained funding. Consequently, more children were enrolled in full-day (95.6%) kindergarten programs than half-day kindergarten programs (4.4%). The average class size as reported by teachers was 22; and 9.7% of the children in each classroom were receiving free or reduced lunch-price.

In 2008 Arizona implemented requirements to provide 4-hours per day of English Language Development instruction for the first year in which the pupil is an English language learner. According to the teacher report, 24.8% of the kindergarten classrooms in which children were enrolled were specifically designated for English Language Learners.

Kindergarten Transition Practices. Teachers also provided information about the types of kindergarten transition activities they provided in preparation for the 2009 kindergarten school year (Table 1). Teachers were more likely to implement transition activities before the school year began than after. Informal contacts such as sending the family a letter or holding an open house were more prevalent than direct contact with children or families. Few teachers conducted benchmark assessments of children's development at the start of the school year.

Table 1.
Percent of Kindergarten Transitions Activities Provided Prior to or After the Start of the School Year.

Activity	% Prior to start of kindergarten	% After start of kindergarten
Contact with teacher	45.7	n/a
Type of contact		
Visited child's home	4.1	n/a
Visited child's preschool classroom	12.4	n/a
Called child's family	7.4	5.4
Called child	4.1	2.8
Sent family a letter	23.4	14.5
Held an open house	41.7	19.6
Conducted K readiness assessment	18.2	13.6

FAMILY CHARACTERISTICS

In this section, we report demographic data received from Part A of the guardian survey. Guardian, education, marital status, income, and language spoken in the home are discussed.

Guardian Education. Guardians in the study identified themselves as follows; 74% mothers, 22% fathers, 4% other (i.e., grandparent, step, foster, adoptive parent, or legal guardian). Table 2 displays the level of guardian education as indicated on the questionnaires returned from the families of the participating children (98% return rate). These data are representative of the education levels of guardians in Arizona's birth-age 5 population as reported by the 2010 Arizona Health Survey.[28]

Table 2
Level of Guardian Education

	AKRS *	AZ Health Survey 2010
Less than high school	12.4%	14.8 %
High school diploma	19.1%	23.9%
Some college/voc/AA	37.4%	30.9%
B.A. or higher	31.1%	30.3%

*Weighted totals

Guardian Marital Status. Guardians also provided information about marital status; 72% were married; 17% single and never married; 6% divorced; 4% separated, and 1% was widowed. In comparison, 75.3 % of Arizona's children aged 0-5 are from married families.[29] National studies of kindergartner readiness report similar demographics, with 75% of their child participants being from married families.[30]

Family Income. Many of the participating families (47.2%) reported an income of above $50,000. This is similar to Arizona's median income of $52,296 as reported the U.S Census Bureau's Arizona Community Survey.[31] A significant number of children (25.3%) came from families living at or below 100% of the poverty level, which is identical to state estimates (25.3%) and nearly identical to national estimates (26.4%) as reported in the 2010 Arizona Health Survey and the 2009 Arizona Community Survey respectively.

Home Language. A majority of guardians (76.7%) in the sample identified English as the

primary language spoken in the home; 21.5% reported Spanish as their primary language; and 1.8% of guardians listed a primary language other than English or Spanish. When compared to state averages, slightly more of AKRS participants spoke English as their primary language than the percentage reported for the state (72.1%).[32] However, the percentages of Spanish speakers in AKRS (21.5%) and the state (21.7%) are nearly equivalent.[33]

Child Characteristics

In this section of the report we describe demographic characteristics of child participants. Data were collected from the guardian, teacher, or a combination of both. Child gender, age, ethnicity/race, special needs, participation in free or reduced lunch program, participation in early care and education experience prior to kindergarten entry, and days in kindergarten at time of assessment are discussed.

Gender and Age. Just over half of the participating kindergarteners were male (51.3%) and 48.7% were female. These figures are nearly identical to the gender distribution in the state for 2008-2009 elementary enrollments,[34]as well as those reported in the Arizona Health Survey, 2010 (51.1% males; 48.9% females).[35] Children ranged in age from 5 years and 6 months to 6 years and 7 months, with the average age at assessment being 5 years 8 months. Arizona's cut-date for kindergarten entry is September 1. While each school district in Arizona is required to offer kindergarten, compulsory age of attendance is 6 years.

The age of Arizona's first time kindergartners participating in this study may reflect guardians' decision to delay their child's entrance to kindergarten. Since the early 1990's, the age of kindergarten entrance has risen[36] due to guardian preference and school policies favor delaying kindergarten entry, particularly for students with summer birthdays. Many guardians of children with summer birthdates delay kindergarten entry with the goal of improving academic achievement or athletic opportunities for children. The combination of summer birthdates and compulsory age of attendance may explain why more children over the age of six participated in this study than other national studies of kindergarten children.[37]

Ethnicity/Race. Percentages for the ethnic/racial backgrounds of children in AKRS are provided in Table 3. This sample has a higher representation of Hispanic kindergartners (49%) than the percentage of elementary students identified as Hispanic (40.8%) by the Arizona Department of Education in the 2008-2009 school year.[38] About the same percentage of Native American children were participants in AKRS (3.5%) as attended Arizona's elementary schools in 2008-2009 (3.08%).

The University Consortium recognizes Arizona Tribes as sovereign nations that have the right to regulate research on their tribal lands. With such recognition, the Consortium did not collect data from tribal community members or agencies within tribal jurisdiction during the first Wave of AKRS because it did not have tribal permissions. To date (2011), tribal permission has been granted by 5 of the 19 federally-recognized Arizona tribes.

The Consortium acknowledges that in order to gain an accurate understanding of the impact of First Things First children from various regions, programs and demographic groups, including tribal communities need to be included. Acknowledging the importance of inclusiveness the Consortium plans to collect data within the jurisdiction of the five tribal communities from which permission were granted in future waves of AKRS.

Table 3.
Child Ethnicity

	Percent
Ethnicity	
Hispanic	49.1
Non-Hispanic	50.9
Race	
American Indian non-Hispanic	2.7
American Indian Hispanic	0.8
Asian non-Hispanic	3.9
Asian Hispanic	0.1
Black non-Hispanic	7.1
Black Hispanic	1.0
Native Hawaiian non-Hispanic	0.6
Native Hawaiian Hispanic	0.1
White non-Hispanic	53.6
White Hispanic	22
Multi non-Hispanic	6.0
Multi Hispanic	2.1

Free or Reduced-price Lunch. Guardians identified children's participation in the free or reduced-price lunch. A little over one-half of Arizona's first time kindergartners (51.3%) were receiving free or reduced-price lunch. This percentage is equivalent to the state average as reported by the Children's Action Alliance.[39] It is notable that Arizona is only one of five states where the percentage of children receiving a free or reduced-price lunch increased by double digits (11.3%) in one year (from 2008 to 2009).[40]

Special Needs. Guardians reported that 5.5% of the children were on an *Individualized Education Plan* (IEP). This figure is slightly lower than the national percentage of 5-year-old children (7.6%) receiving early intervention services.[41] However; Arizona has typically served less than the national percentage of children with special needs since at least 2004.[42]

Early Care and Education Experiences. As previously discussed, attendance in early care and education programs is known to improve kindergarten readiness. Almost three out of four (73.8%) of Arizona's first-time kindergartners participated in some type of out-of-home care prior to kindergarten entry (see Table4). This percentage is nearly the same as the national estimate (73%) of children ages 3-5 participating in out-of-home care prior to kindergarten. [43]

Table 4
Early Care and Education Program Attendance by Type

	Percent
Attended	73.8
Type of program attended	
Public School	21.7
Child Care Center	51.1
Small Group Home	1.6
Unknown	25.6

Information about attendance in early care and education programs was obtained though the guardian survey item which asked, "*Did the child ever attend preschool (a child care center, nursery school or other preschool program including Head Start*)". Guardians who responded "yes" to this question were asked to supply the name, address, and telephone number of the care provider. Retrospective data analysis was used to categorize "type of care". Information

obtained from the survey was compared to the Arizona Child Care Licensing database [44]which categorizes licensed child care facilities into three distinct categories; child care centers, public school, and small group homes. Cases marked "unknown" did not contain enough identifying information to accurately locate the program in the database. While there is a possibility that child care programs of unknown type were unregulated providers, we cannot say so with certainty.

On average, children spent 19.6 hours per week in early care and education settings prior to kindergarten. Children who attended *child care centers* spent more time per week (22 hours) in out-of-home care than did children who attended programs in *public schools* (15 hours per week).

Guardians were also asked to rate the top factors they considered in selecting their early care and education provider. The majority of guardians ranked safety and cleanliness (41.7%) as the first and most important factor they consider when selecting their care provider. The next four most important factors considered by guardians were *reputation* (37.9 %), *teacher qualifications* (34.2%) *handling of medical emergencies* (31.6%), and *variety of activities* (31.1%). Slightly fewer guardians ranked age-appropriate curriculum (30.7%) and teacher-child ratio (27.2) as the most important thing they consider when selecting an early care and education provider.

Days in Kindergarten. Data for this study were collected from August to December 2009. Days in kindergarten at time of assessment ranged from 11 to 142 days, with average days in kindergarten at time of assessment being 103 days (*sd* =19.66).

SECTION III: ARIZONA'S KINDERGARTNERS IN 2009

Children's readiness for school is influenced by both family circumstances and access to services and educational opportunities necessary for healthy development. It is well known that family circumstances, particularly family economic security, affect children's development. It is also understood that children's early experiences affect children's development in both positive and negative ways. Furthermore, we know that the achievement gap begins at birth, with children from minority or low-income backgrounds having less access to the services and educational programs known to contribute to long-term physical well-being and academic and social gains. Therefore, data on children's development, presented in the following sections of this report, are grounded by family and child characteristics, such as guardian education, marital status, preschool attendance, race/ethnicity, and income, among other factors.

PHYSICAL WELL-BEING AND MOTOR DEVELOPMENT

The National Education Goals Panel identified physical well-being and motor development as one of five key dimensions of school readiness.[45] A lack of physical well-being, or poor health, can affect learning in a variety of ways including:

- by damaging a child's brain structure and functioning;
- by causing a child to miss school due to illness or conflicts with medical care; or
- by causing pain, distress or hunger that interferes with the child's learning during school[46]

In AKRS we asked guardians a variety of questions related to health and health services use. For some questions we present guardian responses by specific subgroups that may be used for targeting interventions such as poverty level, and urban or rural residence. We have estimated poverty by using the midpoint of the income reported by the family and number of people living in the household to estimate the family's income as a ratio of the poverty level, according to federal guidelines.

Measure of Overall Health. Children's overall health was measured by the response to the question: *Would you say the child's overall health is: Excellent, Very good, Good, Fair or Poor?* Guardian ratings of children's overall health have been used in many studies including the National Survey of Early Child Health [47] the National Survey of Children's Health [48] and the

Head Start Impact Study. [49] This global response by a guardian combines their past experiences with their child within the health care system, the feedback they have gotten from clinicians and their observations regarding the health of other children of the same age.

Overall Health. The majority of the children in AKRS were rated as having excellent/very good health (86.1%). This is similar to the percentage of Arizona's children birth to five (82.8%) and national estimates (86.7%) as reported in the Arizona Health Survey.[50] Relatively few children in AKRS were rated in fair health (2.1%) or poor health (0.2%). However as poverty levels increase, families are more likely to rate their children as having fair to poor health (Table 5)

Table 5.
Children's Overall Health by Poverty Status

	Poor/Fair	Good	Very Good	Excellent
< 100% of the poverty line (More poverty)	4.0%	18.4%	30.9%	46.6%
100-135% of the poverty line	3.8%	10.4%	34.0%	51.9%
135-185% of the poverty line	0.0%	11.0%	28.4%	60.6%
> 185% of the poverty line (Less poverty)	1.1%	5.1%	24.3%	69.5%

P <= 0.001

Access to Health and Dental Insurance. A significant number of the children had access to health (90.9%) and dental insurance (87.9%). The percentage of children in AKRS with health insurance was slightly higher than the percentage of birth-five year olds in Arizona with health coverage (88.5%).[51] Of those children with health insurance coverage, 72.2% were covered by private insurance provided through an employer or purchased directly. Other children were covered from a multitude of public providers such as Medicaid/AHCCCS, Kidscare, military, Indian Health Services). Access to health insurance was more prevelant for children living in urban areas (73.5%) than rural areas (69.3%) of the state, with children in rural areas being more likey to be covered by publicly funded health insurance.

Health Service Usage. Guardians reported that the majority of children (94.8%) had a well-child visit and 88.7% had visited the dentist in the last 12 months. Of those children who had received a well-child visit, most had received the service from a doctor or nurse practitioner in a private or group practice (81.7%) followed by a community health center or public clinic (11.2%). Guardians were less likely to

use other types of medical providers for preventative care, such as hospitals (4%), urgent care centers (1.58%), the emergency room (.4%), schools (.2%) or "other" (.7%).

The majority of the children had received their first dental visit by age 4 (Table6). Only 6.6% had received a dental visit by 12 months, which is the age recommended by the American Academy of Pediatrics.[52] One out of 10 had not received a dental visit by the time their guardians were surveyed in the fall of the kindergarten year.

Table 6.
Age at First Dental Visit

Age at First Visit	% of Children with a Dental Visit by age
By 12 months/1 year	6.6
By 24 months/2 years	23.4
By 36 months/3 years	56.5
By 48 months/4 years	78.3
By 60 months/5 years	87.8
By 74 months/6 years, 2 months	90.4
Not seen by fall 2009	9.6

History of Health Conditions or Problems. Health conditions and developmental concerns were obtained by asking guardians to respond to the following question: *For each condition please check the box in the table below if a doctor or other professional ever told you or a previous primary caregiver that the child had the condition*. This question was a slightly modified version from a question in the 2007 National Survey of Child Health .[53] When interpreting these findings, please note that some conditions were reported by very small numbers of guardians, so we are reporting the more common conditions and group some conditions and problems together that were conceptually similar (i.e. mental health problems).

Guardians reported that children had experienced more difficulties with oral health than other health conditions or problems (Table 7). However, as noted above, very few guardians reported their child had received the AAP-recommended first dental visit by 12 months and only 10% had received a dental visit by age two. Additionally, there was a significant relationship between a history of health problems and poverty such that children in the higher poverty groups were more likely to be reported as having a history of teeth and gum problems or other health problems (Table 8).

Table 7.
Percent Child History of Health Conditions or Problems

	Teeth & Gum Problems	Asthma	Speech Problems	Mental Health or Behavior Problems	Hearing or Vision Problems	Learning Disability or Developmental Delay
% Ever Had the Condition	22.4%	11.7%	11.5%	8.6%%	4.5%	3.0%

Table 8.
Child History of Health Conditions or Problems and Poverty Status

	Teeth & Gums*	Asthma	Speech*	Mental Health or Behavior*	Hearing or Vision*	Learning or Development
< 100% of the poverty line (More poverty)	34.9%	14.6%	17.8%	19.3%	7.6%	6.2%
100-135% of the poverty line	22.6%	12.8%	10.5%	11.0%	4.3%	3.3%
135-185% of the poverty line	20.4%	15.3%	11.6%	3.8%	1.9%	1.3%
> 185% of the poverty line (Less poverty)	13.6%	10.0%	10.0%	6.0%	2.3%	2.8%

*=statistically significant finding

Developmental Concerns. We measured guardian concern about development through the following question: *Do you have any concerns about child's learning, development, or behavior*, which was drawn from the 2007 National Survey of Child Health and is also the first question used in the *Guardians' Evaluation of Developmental Status (PEDS).* [54] We added: *Do you have any concerns about child's hearing or vision,* and questions about whether the guardian had expressed these concerns to a doctor, medical professional, teacher or school counselor. The following questions were drawn from the Children With Special Health Care Needs Screener: [55] *Is child limited or prevented in any way in his/her ability to do the things most children of the same age can do?; (If yes), Is his/her limitation in abilities because of ANY medical, behavioral, or other health condition?; (If yes); Is this a condition that has lasted or is expected to last 12 months or longer?* The full screening tool was not used to minimize response burden for the guardian.

Concerns about child development were quite common, with 20% of the guardians reporting that they had concerns about their children's learning, development or behavior, and 11% reporting concerns about hearing or vision. Guardians of children with more poverty (lower incomes) were most likely to have concerns about their child's learning, development, behavior, hearing and vision (Table 9). Nonetheless, few guardians reported discussing developmental concerns with the child's doctor or another medical professional (21.4%) or teacher (21.3%).

Table 9.
Developmental Concerns and Poverty Status

	% Concerns About Learning, Development or Behavior*	% Concerns About Hearing or Vision*
< 100% of the poverty line (More poverty)	35.6	16.4
100-135% of the poverty line	22.7	14.4
135-185% of the poverty line	15.1	5.7
>185% of the poverty line (Less poverty)	11.9	6.6

*=statistically significant finding

Service Usage. Guardians with concerns about their child's health or development were also asked if they had accessed services for health or developmental concerns in the 12 months prior to AKRS (Table 10). Services receipt ranged from almost 23.7% for teeth and gum problems to 2.4% for learning disability or developmental delay. There are several possible explanations for these findings of low services use. One explanation is that there was a need for services, but there was poor access to healthcare for these conditions and problems. Another explanation is there was no need for services in the previous 12 months because the condition was not particularly severe

Table 10.
Service Use for Child Health Conditions or Problems in the Last 12 Months

	Teeth & Gums	Asthma	Speech	Mental Health or Behavior	Hearing or Vision	Learning or Development
% Used Services	23.7	10.5	9.0	4.9	3.8	2.4

Height, Weight and Body Mass Index. We measured children's weight using calibrated digital scales and height using a standiometer (similar to the method used in a pediatric office). Trained data collectors took 2 measures of both height and weight and the average was recorded. The

Body Mass Index (BMI) is a measure calculated from height and weight (weight in kilograms/height in meters). It is a screening tool for weight and is correlated with body fat percentage. For children, BMI scores were compared with the Centers for Disease Control and Prevention's charts of BMI[56] by age and gender so that an individual child's score gives a percentile ranking of their score relative to other children of the same sex and age.

Most children in AKRS were of normal weight (70%), but 15% were "at risk" for being overweight and 12.9% were overweight or obese. The percent of children found to be overweight in AKRS was slightly lower than the 2008 national rating for two-five year olds (14.8%). Children in higher levels of poverty were more likely to be overweight (19.6%). As poverty level decreased, fewer children were identified as overweight or obese (9.2%) (Table 11).

Table 11.
Body Mass Index and Poverty Status

	Underweight	Normal Weight	At Risk for Overweight	Overweight or Obese
< 100% of the poverty line (More poverty)	0.9	66.7	12.9	19.6
100-135% of the poverty line	1.0	66.3	22.1	10.6
135-185% of the poverty line	0.0	76.2	13.6	10.2
> 185% of the poverty line (Less poverty)	3.5	73.8	13.5	9.2

P < 0.001

Low Birth Weight. Because low birth-weight has shown a consistent relationship with learning difficulties, guardians were also asked to report the child's birth-weight. The standard definition of low birth weight was used, which is 5 pounds, 8 ounces (<2500 grams). In AKRS, 8.1% of the children had a low birth weight. This is the same value as the national percentage reported in 2009 by the National Vital Statistics Report[57]and a little higher than the percentage reported in 2008 for Arizona (7.1%).[58]

Low birth-weight is particularly problematic when combined with poverty. AKRS families with lower incomes had a greater percentage of children with low birth weights especially when

compared to families with the greatest incomes (Table 12), but this was not significant between rural (7.8%) and urban (10.8%) areas of Arizona.

Table 12.
Poverty Status and Percent Low Birth-weight

Level of Poverty	Low Birth Weight
< 100% of the poverty line (More poverty)	11.3%
100-135% of the poverty line	11.8%
135-185% of the poverty line	11.4%
> 185% of the poverty line (Less poverty)	6.4%

P <= 0.1

Health and Learning. To better understand the relationship between health and kindergarten readiness we created a Child Health Risk Index which included the following 9 items:

1. Excellent/very good health
2. Fair/poor health
3. No dental visit in last 12 months
4. No well-child visit in last 12 months
5. Low birth-weight
6. Non-normal BMI
7. Concern about learning, development and behavior and hearing and vision
8. Limitations in ability to do things most children of the same age can do
9. History of one or more health conditions

We then looked at whether guardian ratings on overall health and the Child Health Risk Index had a relationship with child outcomes in the areas of oral language development, literacy development, and mathematics. As expected, higher levels of overall health were positively associated with higher levels of readiness in overall language development, literacy and mathematics. For the Health Risk Index, higher levels of health risk were associated with lower levels of readiness in oral language development, literacy and mathematics. The largest effects on the Health Risk Index were seen in language development. The larger the number of health risks children had, the lower their scores on the Preschool Language Scale (i.e., expressive language, auditory comprehension and total language scores) (see Appendix B, Health Measure tables).

Motor Development

The majority (89.2%) of Arizona's first time kindergartners have well-developed motor skills. A few children need continued support in this area of development (10.8%). In terms of large motor development most children were able to hop on one foot (91%); fewer were able to skip (64.7%) or walk heel to toe on a straight line (64.4%). In terms of specific fine motor skills, the majority of the children were able to stack 8 cubes (90.7%), copy numerals 1-5 (83.9%), and draw a person with 6 parts (83.5%); fewer children were able to tie a knot (58%).

Girls showed better overall motor coordination than the boys, with girls scoring 1.0% higher on total motor ability than boys. Children's approaches to learning also influenced motor skill development. Children rated as *on-track* in approaches to learning (see Approaches To Learning below) have more developed motor skills (92.4%) than do children who were rated as *developing* approaches to learning (82%).

Conclusion. Overall, children's health was rated as very good to excellent, with the majority of children having access to medical and dental insurance. While guardians did express some concerns about their children's learning, behavior and oral health, few reported speaking to a medical professional or teacher about their concerns. Guardians from low-income backgrounds were most likely to express concerns about their child's health and development which may indicate that this group is uncomfortable speaking to service providers about their child health and development.

Problems with teeth and gums were the most common health problem noted in AKRS. Although the majority of families had dental insurance it seems that many may not understand the recommended practices for oral health as one in ten children had not received preventative medical care at kindergarten entry.

Although most children had received a well-child check up from a doctor or nurse practitioner in a private or group practice in the 12 months proceeding kindergarten entry, nearly 13% of the children in AKRS were identified as being overweight or obese. Fortunately, the majority of children in AKRS had age-appropriate motor skills that allow them to participate in physical

activities known to counteract obesity. It may be the case that the families of Arizona's preschoolers and beginning kindergartens need more knowledge about the health risks associated with obesity and how regular engagement in physical activity might alleviate these risks.

Finally, there was a significant relationship between the number of health risks children have and their development in the domains of oral language, literacy and mathematical knowledge such that children with more health risks possess fewer of the skills needed for a successful start in school. This finding reinforces the notion that children's physical well-being and motor development are important precursors to children's readiness for school (see Appendix B, Motor tables).

Social and Emotional Development

Social and emotional skills are important for kindergarten readiness and are related to long term economic [59] and social success.[60] Fortunately, Arizona's first time kindergartners display high levels of social competence according to both their teachers and guardians. Teachers (92.2%) and guardians (82.6%) report that the majority of Arizona's first time kindergartners possess the *protective factors* (i.e., strong attachments, initiative, and self control) that will help them to be successful when facing social and academic challenges in school and life.

Both teachers and guardians indicate that most children have a great deal of self control, 94.2% and 87.2% respectively. Specifically, guardians find that Arizona's first time kindergartners show strengths in controlling anger (83.8%) and cooperating with others (78.7%). Teachers find children's strengths to be listening to and respecting others (70.5%) and sharing (69.7%).

However, teachers and guardians do relay some concerns about children's *protective factors*. In the case of protective factors, a "concern" would mean that the child shows fewer competencies in an area that would contribute to her/his resilience or ability to "bounce back" when faced with social or academic problems. Both guardians and teachers rated children lowest on items related to attachment. Guardians reported that 23.4% of children did not *respond positively when adults offered help when child was upset.* Teachers found that few children initiated interactions with adults by doing such things as *asking an adult to play or read with them* (34%).

Overall, teachers (89.9%) and guardians (65.5%) believe most children display positive behaviors (e.g., ability to make friends, share, and control temper) that will contribute to their participation in learning and classroom life. However, both teachers and guardians had concerns about the challenging behaviors displayed by small percentages of children 10.1% and 34.5%, respectively. Teachers were more likely to be concerned about children being easily distracted (17.1%) and guardians were most concerned about children having a short attention span (33.9%).

It is important to remember that the foundation for the development of socioemotional skills begins within the context of children's families.[62] Based on guardian and teacher reports, receipt of free or reduced lunch-price is the best predicator of children's social skills at kindergarten entry, with children receiving free and reduced lunch prices scoring lower on measures of *protective* social skills. Language spoken in the home also influences social and emotional development with guardians of children who speak a language other than English reporting more concerns about their children's social and emotional development. Additionally, according to teacher reports, gender plays an important role in behavioral concerns with girls being identified as exhibiting fewer challenging behaviors than boys.

Social and Emotional Development and Learning. Socio-emotional development has a positive effect on learning outcomes (see Appendix B, Social Emotional Development Tables). The more *protective factors* a child has, the higher they score in all academic domains. As scores on both the teacher and guardian *DECA* total protective factors improve, so do children's scores on language development, literacy skills (i.e., alphabet knowledge, print awareness, name writing, and concepts of print), and mathematics. The largest effects were seen in oral language development. The higher teachers and guardians rated children on total *protective factors*, the higher their total scores were on the Preschool Language Scale.

Conclusion

As rated by their teachers, the majority of first-time kindergartners (92.2%) possess the social skills that will lead to school success; a small percentage (8.8%) of children need additional

support in developing the types of social skills that will lead to social and academic competence in school and beyond.

Teachers indicate that a small percentage of children (10%) display challenging behaviors that may interfere with their learning or overall social competence. Teachers report that boys display more challenging behaviors at kindergarten entry than do girls. For this small group of children, guardians showed most concern about their children's abilities to stay attentive and focused on tasks; teachers were most concerned about children's distractibility.

Social and Emotional skills play an important role in learning and kindergarten readiness. As children's scores on measures of social and emotional development increase so do their scores on measures of language development, literacy, and mathematical knowledge.

Approaches to Learning

There are no measures specifically designed to assess the broad construct of approach to learning. Thus, the Consortium created the *AKRS Approaches to Learning Index* based on the work of Hair and colleagues.[63] The index was created from a subset of 5 questions on the teacher reported Devereux Early Childhood Assessment (*DECA*) and a subset of 5 questions on the Socio-Emotional Development Section of the Teacher Survey Part B. These ten items cover dispositions such as persistence, curiosity, problem solving, decision making, and risk taking during learning.

Scoring for the *AKRS Approaches to Learning Index follows.*

- Children received a score of 1 for each *DECA* item teachers rated as *occasionally*, *frequently*, and *very frequently*. They receive a score of 0 for each *DECA* item teachers rated as *rarely* or *never*.
- Children also received a score of 1 for each item on the Teacher Survey Part B items that teachers scored as *proficient* or *in progress*. They receive a score of 0 if teachers rated the item as *not yet*.

Thus, the range of scores possible on *AKRS Approaches to Learning Index* is 0 through 10.

- Children with a score of 9 or 10 were considered ***on-track*** in approaches to learning skills.
- Children with a score of 8 or less were considered to be ***developing*** approaches to learning skills.

Overall, the majority of the children in AKRS study are *on track* in approaches to learning (82.5%). Roughly 17% are *developing* approaches to learning. Children who are still *developing* approaches to learning skills were less likely to be identified by their teachers as learners who display persistence, problem solving, independent decision making, risk taking in learning, and curiosity. This does not mean that this group of children do not possess these skills, but rather that they are underdeveloped.

Results further show that children's levels of approaches to learning (*on-track* or *developing*) are affected, both positively and negatively, by family and economic factors. Children from two-parent families with higher levels of income and higher levels of guardian education were more likely to be rated as *on-track* in approaches to learning. Children receiving free or reduced lunch prices were the most likely to score at the *developing* level on the *Approaches to Learning Index* (see Appendix C, Approaches to Learning Tables).

Perhaps most importantly, total oral language development, alphabet knowledge, print and rhyme development, mathematics, and motor development scores increase significantly as children's scores on the *AKRS Approaches to Learning Index* increase (see Appendix C, Approaches to Learning Tables). This finding adds credibility to the importance of these skills for kindergarten readiness.

Approaches to learning scores were not significantly affected by guardian involvement in learning at home, days in kindergarten, or participation in kindergarten transition activities.

Conclusion

As children enter kindergarten for the first time, the majorities are rated as exhibiting behaviors associated with a positive approach to learning (e.g., show eagerness to learn, persist at tasks). A few need additional support in this domain of development. This finding is important when we consider the fact that children's scores on total language development, alphabet knowledge, print and rhyme awareness, mathematics, and motor development increase as children's scores on the *AKRS Approaches to Learning Index* increase.

Language and Literacy Development

Oral Language Development. The majority of both English (93.3%) and Spanish-speaking (87.6%) kindergartners show normal or above average development in the overall language skills needed to succeed in school. Children's results are stronger in expressive language skills than they are in auditory comprehension skills. In terms of expressive language skills both English (95.8%) speaking and Spanish speaking (90.7%) kindergartners show strong aptitude (at or above developmental ranges) in using language (e.g., conveying messages that are understandable to others, using pronouns and verb tense correctly, describing needs and wants, etc.). The majority of Arizona's English speaking (92.7%) and Spanish speaking (81.2%) kindergartners also show strengths in auditory comprehension skills.

Few children are below the average developmental norms in auditory comprehension, expressive language skills or total language skills see Table 13. Both English and Spanish speaking kindergartners have less developed auditory language skills than they do expressive language skills.

Table 13
English and Spanish Children Below Developmental Range in Language

	English Speaking	Spanish Speaking
	Below Developmental Range	Below Developmental Range
Expressive Language	4.2%	9.3%
Auditory Language	7.4%	18.8%
Total Language	6.7%	11.9%

Children's total language skills were slightly affected by days in kindergarten such that as number of days in kindergarten at time of assessment increased, children's scores on total language increased by .09%. The strongest predictors of variation in children's language development were approaches to learning (7.0%), guardian education (3.2%) and receipt of free or reduced lunch price (2.2%). (see Appendix B, Language Development Tables).

Literacy. The Arizona Early Learning standards address many of the emergent literacy skills known to predict reading achievement. They recommend that children know 10 letters of the alphabet, and recognize some beginning sounds prior to kindergarten. They also recommend that children enter kindergarten with important literacy skills such as, how to write some letters of their name, identify rhyming words, understand that print goes from left to right, and recognize the title in a book and writing some letters in their name. All of these skills were assessed in AKRS through the PALS Pre-K literacy assessment.

Arizona's first-time kindergartners possess many of the emergent literacy skills predictive of later school success (see Table 14). The majority of the children accurately name upper and lower case letters of the alphabet and know beginning letter sounds, indicating they are at or above developmental norms for literacy development.

Table 14
Percent of Children Demonstrating Specific Alphabet Knowledge Skills.

	0-9 letters	10-20 letters	21-26 letters
Upper case alphabet	5.6%	13.8	80.6
Lower case alphabet	4.4%	10.2	85.4
Beginning letter sounds	3.4%	5.5	91.1

Rhyme. Rhyming ability demonstrates children's understanding that speech can be broken down into individual words. It is an important precursor to the phonemic awareness skills needed to decode printed words. Approximately 83% of the children participating in AKRS display the age-appropriate rhyme awareness skills. Nearly 56% percent could identify more than 7 rhyming words from common word families (e.g., /an/ /op/, /ing/, etc,) and (27%) were able to correctly identify to7 rhyming words. Nearly 17% recognized fewer than 5 rhyming words, indicating need for additional support.

Print and Word Awareness. Children's understanding of concepts of print (e.g., writing represents the sounds of spoken words, book organization, distinction between letters and words, matching spoken words to written words, reading from left to right, etc.) is important to beginning reading. Overall, children possessed developmentally appropriate skills in print awareness. Most children were able to identify letters (95.5%) and simple words (92.9%) in

text—left to right directionality was also a strength (90.5%). Fewer children could move their finger along a line of print (74.4%) or match spoken and printed words (62.2%).

Name Writing. Children's writing progresses from scribbles to the creation of fully formed letters and finally to words and sentences. A child's name is often the first word that children attempt to write. At kindergarten entry, 97.8 % of the children could write their names in a way that was recognizable to others. A small percentage (2.2%) of the children could not form a recognizable signature.

Guardian Involvement in Literacy. It is recommended that guardians read to their children three times per week. Guardians report active engagement in reading and other types of literacy activities in the home to support children's development in both language and literacy. Most of the guardians in AKRS report doing so and nearly a quarter read to their children every day (see Table 15). These findings are similar to those in the 2010 Arizona Health Survey which found that 65% of Arizona's children aged birth to 5 years of age are read to 3-6 times per week and 24% of parents read to their children daily.

Table 15
Percent Parents Participating in Literacy Activities by Times per Week.

	Read Books	Tell Stories	Sing Songs
Not at All	1.4	7.5	4.3
1-2 Times a Week	27.8	34.2	25.5
3-6 Times a Week	46.2	42.2	39.5
7 or More Times a Week	24.4	16.0	30.6

Conclusion. Children participating in AKRS had well-developed language and literacy skills and the majority of their guardians provided recommended amounts of support (3-6 times per week) at home. Children's strengths are in the domains of expressive language, alphabet knowledge and name writing. The findings presented here suggest that families and early education providers have recognized the important contribution that language and literacy skills play in preparing children for kindergarten.

Nearly 40% of beginning kindergartners need more support in advanced literacy skills such as matching spoken and printed words, and approximately 17% would benefit from additional exposure to phonological awareness activities such as rhyming.

Finally, guardian education proved to be most influential on literacy outcomes (see Appendix B, Language and Literacy Tables)**.** Meaning that the higher a guardians level of education, the better their child performed on all literacy assessments. This was true for all literacy assessments, except for name writing. This may be because 97.8% of kindergartens in the study were able to write their name. In addition to guardian education, approaches to learning and free lunch status also proved to be important predictors of literacy outcomes. For the PLS assessments, language spoken in the home was a significant predictor of performance. Children who spoke Spanish in the home received scores 12.5% lower than children whose primary language in the home was English. Days in Kindergarten had a significant impact on some literacy outcomes; however, it is less than 1% that children's scores improve the longer they are in kindergarten.

Cognition and General Knowledge

Young children's mathematical thinking provides the foundation for higher order thinking. The recognition of basic math skills (i.e., classification of objects, counting by matching number names to items as they are counted, simple addition of small groups of objects, naming and describing the attributes of shapes, and recognizing written numerals.) as the strongest predictor of later reading and math achievement [64] points to the significance that mathematical knowledge has on children's overall development.

For the purposes of this report, children's mathematical proficiency is based on teacher ratings. While all children participating in AKRS were assessed with the Research Based Mathematics Assessment [65] (REMA), the norms have not yet been made available from the publisher. As soon as the Consortium is provided with the norms, an addendum will be added to this report describing child outcomes on the REMA assessment. As noted previously, teachers do provide fair and valid evaluations of their student's beginning math skills.[66] Therefore; we suspect that teacher reported data collected in AKRS will be representative of children's overall early math development as measured by the REMA.

Part B of the AKRS Teacher Survey was used to solicit rating of children's math proficiency as described above and in the Arizona's Early Learning Guidelines.[67] Teachers rated children on ten math skills, on a three-point scale of *proficient, in progress*, and *not yet*. Teacher ratings were combined to create a standard score on a three-point scale.

Nearly 48% of the children were rated as proficient in early mathematical thinking, 46.2 % were rated *in progress* and 6% were rated as *not yet*. Arizona's kindergarten children are at age-appropriate levels in emergent numeracy skills, with the majority (85.4%) counting up to ten items using one-to-one correspondence. Teachers also report that 78.7% of the children can correctly identify numerals 1 through 10. Fewer (63%) first-time kindergartners were able to describe changes in sets of objects when they are combined (simple addition).

In terms of early skills in geometric thinking, children could identify basic shapes (84.9%). Fewer children were able to describe the attributes of shapes (63%) or use measurement terms such as, longer, shorter, or heavier to describe objects (63%).

Understanding of simple classification (sorting and matching) and basic patterns lay the foundation for algebraic thinking. Nearly 83% of first-time kindergartners could match and sort objects and 78.2% could create simple patterns.

It is known that parents engage fewer in mathematical activities with their children than they do literacy activities and those who do focus mostly on counting.[68] AKRS confirms this finding (Table 16). This may provide some explanation for children scoring lower on mathematics proficiency than other domains of development.

Table 16
Percent Guardian Involvement in Mathematics Activities in the Home

	Size and Weight	Count	Sort	Build
Not at All	13.0	1.2	11.7	6.9
1-2 Times a Week	40.4	13.1	45.4	29.6
3-6 Times a Week	33.4	42.6	31.7	33.1
7 or More Times a Week	13.2	43.0	11.2	30.3

Several factors proved to be significant in predicting children's development in mathematics. The three that have the largest impact on math proficiency are approaches to learning, language spoken in the home, and free lunch status. Approaches to learning is a ten point scale, ten being the child has the most positive skills and abilities to help them learn. As a child's score increased on the approaches to learning scale, so did their score on math proficiency. This means that the more skills a child has in approaches to learning, the more proficient they are in math. Children who speak English in the home are also expected to score higher on the math proficiency; on average they score 1.6% higher than their Spanish speaking counterparts. Finally children receiving free or reduced lunch need more help with math than fellow students who are not receiving free and reduced lunch. While days in Kindergarten does have a significant effect on math, it is very small. As days in kindergarten increase, scores on math proficiency increase by only .027% (see Appendix B, Mathematics Tables).

Conclusion. We have learned a great deal about young children's mathematical capabilities (NCTM, 2000). Research indicates that children explore and use many mathematical ideas and processes in their homes and early care and education programs. [69] Unfortunately, much of children's mathematical thinking goes unnoticed by guardians and teachers alike. This lack of information may cause guardians and early care and education providers to focus efforts on reinforcing counting at the expense of other important mathematical concepts and processes.[70]

The majority of Arizona's first time kindergartners possess many early math skills that will contribute to later success. However, they score lower in the cognitive domain of development than in other domains. It is possible that the recent emphasis on development of literacy skills has caused decreased attention to early mathematical thinking.

Arizona's children would benefit from interventions focused on simple addition, describing attributes of shapes, and using measurement words to describe objects. Nearly 1 in 5 needs additional support in indentifying numerals and creating simple patterns.

Conclusion and Recommendations

This report describes Arizona's first statewide effort to collect a systematic, uniform set of data related to children's readiness for school. The findings and interpretations from this initial evaluation are for the base-year of First Things First's program operation, prior to any substantial funding distribution throughout the state. These baseline data show that the majority of children entering Arizona's kindergarten classrooms are healthy, well-rounded and well-prepared for kindergarten. However, there are areas in which schools, families and communities might band together to reach Arizona's vision of all children entering school healthy and ready to succeed. A summary of key findings from AKRS and subsequent findings follow.

Summary of Key Findings

Beginning Kindergartners and Their Families

- 51% of the children were non-Hispanic; 49% were Hispanic
- 48.7% of the children were females and 51.3% were males.
- Average age at assessment was 5 years 8 months
- 5.5% of the children were on an Individualized Education Plan.
- A little over half of the children were receiving free or reduced-price lunch.
- Nearly 74% of children had attended an early care and education program prior to kindergarten.
- Guardians in the study were distributed as follows, 74% mothers, 27% fathers, 4% other. These sum to greater than 100% due to some parents/guardians marking multiple roles).
- Approximately 31% of guardians had a high school diploma or less, 38% had some college or an associate's degree and 31% had a bachelor's degree or higher.
- 72% of guardians were married, 6% divorced, 4% separated and 1% was widowed.
- English was the home language for most of the families (76.7%), 21.5% reported Spanish as their home language, and 1.8% listed a primary language other than English or Spanish.

Physical-Health and Well-being

- 86.1% of first-time kindergartners were in very good or excellent health.
- 90.9% of the children had access to health insurance and 87.9% had access to dental insurance.
- 94.6% of the children had received a well-child check up in the year prior to kindergarten entry.
- 88.7% of the children had visited the dentist in the 12 months preceding the study.

- 9.6% of the children had never seen a dentist at the time of assessment.
- Gum and teeth problems were the most common health conditions experienced by the children in the study (22.4%).
- 20% of guardians had concerns about their children's learning, development or behavior; 11% of guardians reported concerns about vision or hearing.
- Only 21% of guardians had discussed health concerns with a medical provider or teacher.
- 15% of the children were at risk for being overweight
- 12.9% of children were obese.
- 8.1% of the children had low birth-weight.
- 89.2% of the entering kindergartners had well-developed motor skills.
- The larger the number of health risks children had, the lower their scores on measures of language development, literacy and mathematics proficiency, with the largest influence on language development.

Social Emotional Development

- Overall, most guardians (65.5%) and teachers (89.9%) believe children display positive social and emotional skills that contribute to school success.
- Guardians reported that kindergartners show strengths in controlling anger (83.8%) and cooperating with others (78.7%).
- Teachers reported children's strengths to be listening to and respecting others (70.5%) and sharing (69.7%).
- Guardians and teachers reported that females have better social skills than males.
- Nearly 10% of teachers and 35% of guardians had concerns about their children's behavior.
- Guardians (33.9%) expressed some concerns about children's behavior, particularly short attention span.
- Teachers reported concerns about distractibility (17.1%).
- Social and emotional development had a positive effect on language development, literacy skills, and mathematics, with the largest effects seen in language development.

Approaches to Learning

- Teachers reported that 82% of children in the AKRS study had positive approaches to learning.
- As children's scores on approaches to learning increased, so did their scores on oral language development, alphabet knowledge, print and rhyme awareness, mathematics and motor development.
- Children from families receiving free or reduced lunch prices were most likely to score at the developing level in approaches to learning.

Language and Literacy Development

- The majority of both English (93.3%) and Spanish-speaking (87.6%) kindergartners show normal or above average development in the overall language skills needed to succeed in school.

- Children have more developed expressive language skills than auditory comprehension skills; this was true of both English speaking (95.8%) and Spanish speaking (90.7%) groups of children.
- The strongest predictors of variation in children's language development were approaches to learning, guardian education, and receipt of free and reduced lunch.
- 94.4% of the children in AKRS knew more than 10 upper-case letters of the alphabet; 95.6% new more than 10 lower-case letters.
- 96.1% knew more than 10 beginning letter sounds.
- 97.8% could write their name at kindergarten entry.
- 85% of the children display age-appropriate rhyming skills.
- Most children were able to identify letters (95.5%) and simple words (92.9%) in text and demonstrated an understanding of left to right directionality (90.5%).
- Fewer children could move their finger along a line of print (74.4%) or match spoken and printed words (62.2%).
- 46.2% of guardians read to their children 3-6 times per week.
- Attendance in an early care and education program prior to kindergarten has a positive effect on language and literacy development.

Cognition and General Knowledge

- Attendance in an early care and education program prior to kindergarten has a positive effect on mathematics proficiency.
- Nearly 50% of the children were rated as proficient in early mathematical thinking.
- 85.3% can count up to ten using 1-to-1 correspondence.
- 78.7% of the children correctly identified numerals 1 through 10.
- 84% of the children could identify basic shapes.
- Nearly 83% of entering kindergartners could match and sort objects.
- Only 63% on children in AKRS could describe the attributes of shapes or use measurement terms such as, longer, shorter or heavier to describe objects.
- Nearly 1 in 5 children need support creating simple patterns.

Recommendations

Physical Well-Being and Motor Development

- A little more than one in five children had a history of oral health problems in the AKRS, including dental caries. Very few parents reported their child had received the AAP-recommended first dental visit by 12 months and a little less than a quarter had received a dental by age 2.
    - *Thus, it is important to provide interventions focused on children birth-to-three and their families that aim to prevent oral health problems and establish good oral hygiene.*
- Almost 30% of the entering kindergartners were at risk of being overweight or were already obese.
    - *Therefore, health agencies and schools should promote and facilitate the implementation of structured nutritional and exercise intervention programs as*

well as education programs aimed at parents to reduce the prevalence of child obesity in the state.

- Almost one in five (18.7%) parents reported concerns about their child's learning, development or behavior and 11.1% reported concerns about hearing or vision.
    - *To address this delay in recognition, the Center for Disease Control has made several recommendations: a) develop, test and monitor (particularly in primary care) community-based models for conducting developmental screening and providing the needed care; b) increase education of health professionals about the need for screening and how to screen; c) increase general awareness about the need for developmental screening.*

Social Emotional Development

- Teachers (92.2%) and guardians (82.6%) report that the majority of Arizona's first time kindergartners possess the *protective factors* (i.e., strong attachments, initiative, and self control) that will help them to be successful when facing social and academic challenges in school and life. However, several family and economic factors contributed to lower scores in overall social emotional development.
    - *Even though the current economic conditions in Arizona have exacerbated these conditions and severely taxed the resources of state and social service agencies to address the needs of families, every effort should be made to increase access to high quality mental health, social and educational services, both in and out of school to ensure that families have the resources available to support their children's healthy growth.*

Approaches to Learning

- Roughly 17% of children in AKRS were rated by their teachers as *developing* approaches to learning. Children who were still *developing* approaches to learning skills were less likely to be identified by their teachers as learners who display persistence, problem solving, independent decision making, risk taking in learning, and curiosity.
    - *Because children's approaches to learning had significant effects on children's mathematics proficiency and their auditory language development, all teachers of young children, families, and service providers should receive specific training on this domain of development.*
    - *Children should be provided with access to programs (e.g., creative arts and music programs, visits to children's museums, etc.) that encourage persistence, problem solving, independent decision making, curiosity and risk taking in learning.*

Language and Literacy Development

- Kindergartner's expressive language skills were better than their auditory comprehension skills. Activities such as shared book reading, singing songs, and engaging in conversations with children build their auditory comprehension skills. It is recommended that parents read to their young children 3-5 time per week, however, 28.2% of parents in AKRS read to their children 0-2 times per week, this is below national averages.
    - *Thus, families should be provided with programs that encourage culturally relevant literacy activities in the home. Furthermore, educators of young children*

should be provided with coursework or professional development opportunities focused on enhancing children's auditory comprehension skills.

- The majority of first-time kindergartners were proficient in the emergent literacy skills necessary for future literacy achievement. However, 1 in 10 children needed additional support learning left to right directionality, and nearly 40% needed additional assistance with matching spoken and printed words.
    - *Support of programs that introduce families and early care and education providers to interactive reading strategies (e.g. dialogic or shared reading) that support children's understanding of print and how it functions are recommended.*

Cognition and General Knowledge.

- Only 50% of the children in AKRS were rated proficient in mathematics. This is concerning given recent research that shows knowledge of basic mathematics skills at kindergarten entry are more predictive of later school success than literacy skills.
    - *A significant investment in the development of young children's mathematical thinking is warranted. Both programs for families, and curricular and materials for caregivers, as well as training opportunities for both groups are necessary to achieve this goal.*

APPENDIX A
AKRS METHODOLOGICAL REPORT

Design and Sampling Procedures

The Readiness Study used a proportional, stratified random sampling approach for collecting data from approximately 1,200 kindergarten children during the fall of 2009. The first stage in the sampling process was the identification of public and private schools serving kindergarten children in Arizona. Two databases were combined to create a sampling frame of 1,292 public, private, and charter schools serving kindergarten students in Arizona. The first database was obtained from the Arizona Department of Education, Research and Evaluation, Information Technology Department[71] and the second database was obtained from the National Center for Educational Statistics Private School Universe Survey[72]. These two databases provided school identification numbers, school names, addresses, phone numbers, and the number of kindergarten children served for all public, charter, and private schools in Arizona in 2009.

Stratification by Region. For sampling purposes, all public, charter, and private elementary schools (*N*=1292) serving kindergarten children were stratified into three regions (Northern, Central, and Southern) proportionate to the population of schools across three clusters of the 15 counties in the state. The Northern Region contained 14 % or 178 schools in Mohave, La Paz, Yavapai, Coconino, Navajo, Apache, and Gila counties. The Central Region defined by Maricopa County had the largest proportion with 57% or 740 schools. Finally, the Southern Region, including Pima, Pinal, Santa Cruz, Cochise, Graham, Greenlee, and Yuma counties included 374 schools or 29%. We adopted the regional divisions primarily to reduce costs with research teams from each of the three universities being responsible for all phases of the research effort (e.g., recruiting schools, obtaining consents from guardians, administering child assessments, etc.) in their respective regions.

Stratification by Locale. Schools within each of the three regions were further stratified by four levels of locale based on the Census Bureau's definition of community size[73] Locale codes for all schools were obtained from the National Center for Educational Statistics, Common Core of Data (2006-2007/2007-2008) School Locator.[74] Schools identified within a large, midsize, or small city were coded as *city*. Schools located in large, midsize, or small suburbs were coded as *suburb*. Schools in fringe, distant, or remote town areas were coded as *town*, and schools located

in fringe, distant, or remote rural areas were classified as *rural*. We stratified schools by locale to increase the representativeness of types and sizes of schools, ensuring that children from a wide range of urban and rural areas in the state would be included in the final sample. Figure 35 shows the targeted proportional distribution of schools in the 2009 sample for the Readiness Study. The sampling plan called for drawing a final pool of 82 schools: 13 from the Northern Region, 43 from the Central Region and 26 from the Southern Region.

Recruitment of Schools. Once schools were initially selected for participation, personnel from each of the three universities determined whether the school's kindergarten enrollment was more than 28 students. If so, the superintendent of the district was contacted and the study procedures explained. After approval was received from the appropriate district personnel, the school principal was contacted and invited to participate. Charter and private schools were similarly contacted according to their designated levels of administrative structure.

School Exclusion Criteria. Schools with fewer than 28 kindergarten students enrolled in the fall of 2009 were excluded from the study because it was felt like an insufficient range of diversity existed from which to draw a representative sample. Secondly, schools on tribal lands were not included in the initial selection of schools since appropriate approvals could be not be obtained from tribal councils at the time of data collection. Classification as a tribal school was determined through the use of the Arizona Department of Education 2006-2007 *Indian Education Directory*.[75] In addition, if a school originally selected for participation was ineligible based on (a) the number of kindergarten students enrolled, (b) its tribal affiliation, or (c) its decision not to participate, a substitute school was selected from the same region and locale as the initial school. This process was repeated until the appropriate numbers of participating schools were obtained across the respective regions and locales.

Recruitment and Selection of First-time Kindergarten Children

For each participating school, a directory of first–time kindergarten students was then obtained. From these directories, 14 first–time kindergarten children were randomly selected per school or from one class if only one class existed. From schools with two kindergarten classrooms, 7 children were randomly selected from each classroom; from schools with 3 classrooms, 5

children per classroom were randomly drawn; and from schools with more than 3 classrooms, first, 3 classes were randomly selected and, then, the targeted number of children (5 per classroom) was randomly drawn from each. This sampling strategy was used to reduce the reporting burden for individual teachers because they were asked to fill out a questionnaire rating each child's cognitive performance across several domains of readiness as well to complete several questions about their own professional experiences. After children were identified, the general procedure followed was that the teacher sent home in the child's backpack a packet containing a letter explaining the purpose of the study, a parent consent form and a child assent form. The research staff then called parents to confirm they received the packet, further explained the study, responded to any questions, and invited them to participate.

All first–time kindergarten children were eligible for participation in the study, although those children with severe disabilities that prevented them from hearing assessment directions and/or seeing and responding (orally or by pointing) to the various stimulus materials were excluded from the study. The exclusion procedures were explained to teachers and principals by research staff prior to distributing packets. Teachers identified children with disabilities requiring them to be excluded. Also, at this time, teachers identified students needing assessments in Spanish.

Assessment Domains

Several interrelated areas of children's development that predict success in kindergarten were measured both by direct child assessments as well as teacher and guardian questionnaires. These were as follows:

- Physical well-being and motor development
- Personal and social development, including approaches to learning
- Language and Literacy development
- Mathematical thinking

Direct child measures included height and weight, the motor development subset of the *Battelle Developmental Inventory, Screening Test (BDI)*; the *Phonological Assessment of Literacy Screening (PALS), Preschool Language Scale* (PLS-4), and the *Research-based Early Mathematics Assessment (REMA).* In addition, questionnaires were distributed to both parents/guardians and teachers of the participating children. The parent report was a two-part,

85-question survey: Part A focused on parent/family demographics, kindergarten transition experiences, and participation in family/child support services. Part B included a rating (proficient, in progress, not yet) of children's development in the domains of social, physical, language/literacy, and mathematics.

Teachers completed a parallel two-part, 63-question survey with the first part focusing upon professional experiences, classroom size, ethnic distribution, and school demographics. Part B included both demographic information on the children and a rating scale identical to that of the guardians of the child's classroom performance on activities and abilities across socio–emotional, physical, language/literacy, and mathematics domains.

Assessor Recruitment, Training, and Assessment Procedures in the Field

Recruitment and training. Assessors were recruited through posted job descriptions by the human resource departments at each university, flyers distributed by members of the research team, and by word-of-mouth. All candidates were properly screened for employment according to federal and state statutes governing requirements appropriate to employees working directly with children, including fingerprint records checks through the Arizona Department of Public Safety.

Assessors participated in a 40-hour, face-to-face and online training program designed by the research team which included presentations by representatives of the organizations that published the instruments. After initial training and content examinations, all assessors were observed by supervisory personnel administering instruments to children both in university training facilities and in the field. These practice sessions provided assessors with opportunities to learn to manage children, use manipulatives and written materials and to receive immediate feedback on testing protocols by supervisory personnel. After two practice sessions, assessors were then observed by supervisory personnel to determine assessment proficiency. This was accomplished when a child was assessed while the supervisor observed and co-collected the scores. Scores were compared after the assessment battery was completed and reliability was estimated by inter-rater agreement established at 90%. Throughout the data collection period, supervisors systematically observed assessors at school sites to ensure data collection integrity.

Assessment procedures. In the field, two trained assessors administered direct child measures in rooms separate from the child's classroom. Prior to beginning direct child measures, the assessors read a child assent script. After reading the statement, the assessor asked the child to sign his/her name on the space indicated on the form if he/she was willing to participate in the assessment activities. Completed questionnaires were returned by parents/guardians and teachers to secure lock boxes located in the school office.

Direct Child Measures

The instruments had to meet a number of criteria, including: (a) the amount of time the assessment required; (b) cultural sensitivity; (c) age range for which the test had been normed; (d) professional rating of the assessment (recognition in the field); (e) validity; (f) ease of training and assessing inter-rater reliability; (g) ease of administration to parents and children; and (h) ease of data transfer to the research data base. After these decisions were implemented, the battery of tests selected included the following.

Height and weight. The height and weight of each child was measured according to the following protocol developed by the UNICEF. This procedure included having two assessors work together to measure the child's standing height without shoes. Weight was taken using a SECA digital load-cell scale that is accurate to within 100g. Children were weighed without shoes and asked to remove any heavy outerwear such as sweatshirts or jackets. The height and weight measurements were used to calculate a child's body mass index (BMI) (Kg/M2).83 Gender-specific BMI-for-age percentiles were then calculated using the Center for Disease Control anthropometric references to obtain current gender-specific z-scores for height-for-age; weight-for-age; weight-for-height, and BMI-for-age.

Battelle Developmental Inventory, Screening Test (2nd Ed) (BDI-2)[76]**.** Normative data for the *BDI-2* were gathered from over 2,500 children between the ages of birth to 7 years, 11 months. The normative sample closely matches the 2000 U.S. Census (education level based on 2001 data). The five developmental domains assessed by the BDI-2 include personal–social, adaptive, motor, communication and cognitive, for children from birth to 8 years of age. The test can be administered using all or selected domains. The Battelle is designed to identify children with

special needs and to assess the functional abilities of these children. Items are scored depending on whether the child typically completes the item "correctly," "sometimes does so," or "rarely or never completes the task." The BDI-2 offers two types of assessments: the full assessment and the screening test. The full assessment refers to the use of the complete instrument, including all five domains. The screening test refers to an abbreviated instrument that includes 100 test items from the full BDI-2. The BDI-2 includes guidelines for use with children who have developmental disabilities. The test is available in English and Spanish. In this study, we administered only the Motor domain of the screening test, which assesses gross motor, fine motor, and perceptual motor skills.

The motor screening test was used instead of the full Batelle Screening test in order to balance the need for data that would accurately assess the motor domain of school readiness with the need to keep the assessment time for children manageable in light of the AKRS full assessment battery. Elbaum, Gattamorta and Penfield (2010) compared the screening test with the full BDI using a variety of tests in a sample of 142 children, aged 2 to 62 months and found their analyses supports those found in the developer's validation studies of the instrument. The screening test had good psychometric properties (i.e. reliability and validity) with comparable results to the full assessment. For the motor questions, for example, the screener correctly classified children 75-94% with a developmental disability depending on the degree of developmental delay (Elbaum, Gattamorta and Penfield, 2010). Reliability coefficients were over .90.

Devereux Early Childhood Assessment (*DECA*).[77] The *DECA* is a standardized, norm-referenced behavior rating scale that measures resilience in preschool children ages 2-5. The *DECA*, which was normed on a representative, nationwide sample of 2,000 children, is designed to identify children who have behavioral problems and to develop intervention plans based on individual protective and behavioral concern profiles.

The survey forms, available in English and Spanish, are based on the results of research on the characteristics of resilient children. Resilience is defined as the ability to recover from or adjust easily to misfortune or change. The *DECA* includes 3 scales measuring attachment, self-control, and initiative; and also a behavioral concerns scale. The survey consists of 37 items—27 on protective factors and 10 on behavioral concerns. Behaviors are rated as occurring "never,"

"rarely," "occasionally," "frequently," or "very frequently" during the four weeks prior to administering the test.

The *DECA* takes approximately 30 minutes to complete by a parent or teacher. The ratings are based on direct observations of the child. Because young children's development can fluctuate widely, the rater considers only those behaviors they have observed in the four weeks prior to administering the test and avoids comparing the child to other children. The rating is based on the number of times the child exhibited the behavior, not how frequently in comparison to other children. The same form is used for both parent and teacher raters.

Preschool Language Scale-4 (PLS-4).[78] This standardized and norm referenced evaluation tool is used to assess receptive and expressive language skills in infants and young children (2 weeks through 6 years and 11 months of age). It also assesses behaviors considered to be language precursors. The Auditory Comprehension subscale is used to evaluate the child's receptive language skills in the areas of attention; semantics (context) -- vocabulary and concepts; structure (form) -- morphology and syntax; and integrative thinking skills. The Expressive Communication subscale is used to assess expressive language in the areas of vocal development; social communication; semantics (content) -- vocabulary and concepts; structure (form) -- morphology and syntax; and integrative thinking skills.

The standardization sample included 1,200 children, ages 2 weeks to 6 years and 11 months, from the United States. Within each age level, boys and girls each are 50% of the sample. The sample was stratified by parent education level, geographic region, and race, in order to represent the U.S. population. The tool directly screens children and interviews caregivers. The test is available in English and Spanish.

Phonological Awareness Literacy Assessment (PALS-Pre-K). [79]The *PALS-Pre-K* is a direct measure of children's knowledge of several important literacy fundamentals. Items and testing procedures for each subtest were normed on more than 700 children aged 4.1 years to 6.9 years, and validated in over 14 schools across Virginia between 2000 and 2004. Race of pilot participants vary depending on the pilot being complete. Averages across pilots include, 17-49% African-Americans, 50-78% Caucasian, 3-4% Hispanics and 3-5% Other. Children receiving

reduced/free lunch fluctuated between 53-69% and children with regular price lunch were between 31-47%.

The Pilot's statistical analyses showed consistency across the diverse sample of school programs (public, private, and Head Start) and different ethnic backgrounds. It similarly demonstrated that all tasks included in the revised PALS-PreK can be scored accurately and reliably. Language and Literacy to the objectives of the PALS Pre-KTest-retest and split-half reliability assessments were well within the expected range, and content, construct, and criterion-related validity was determined by panels of content experts, factor analyses and correlations with other early literacy measures.

The inclusion of PALS Pre-K in AKRS was based on its close alignment to the Arizona Early Learning Standards and one of the overarching the goal s of the study which is to determine which emergent literacy skills Arizona's children possess at kindergarten entry. The *PALS-Pre-K* assessment in the present study included the following five subtests and took approximately 30 minutes to administer.

Name Writing*:* The assessor asks the child to draw a self-portrait and to write his/her name. Name writing is scored on a developmental continuum, ranging from scribbles to the use of mixed symbols to writing the entire name correctly (score range = 1-7).

Alphabet Knowledge (3 subtests)*:* In the normal administration, the assessor asks the child to name the 26 upper-case letters of the alphabet presented in random order. Children who know 16 or more upper-case letters also take the lower-case alphabet recognition task. Finally, children who know 9 or more lower-case letters are also asked to produce the sounds associated with 23 letters and 3 consonant digraphs (ch, sh, th). In the present administration, however, children were allowed to name as many upper and lower case letters and accompanying sounds as they could (score range = 1-26 for all subtests).

Print and Word Awareness*:* The assessor reads a familiar nursery rhyme printed in a book format and asks the child to point to various text components. In this natural book-reading context children demonstrate their awareness of print concepts such as directionality and the difference between pictures, letters, and words (score range = 1-10).

Rhyme Awareness: The assessor shows the child three pictures and asks the child to name the object depicted in each one. The assessor then asks the child to point to subsequent pictures that rhyme with the first ones presented (score range = 1-10).

Mathematical Thinking. *The Research-Based Early Mathematics Assessment (REMA)*[80] measures children's understanding of mathematics in two broad domains: (a) *numbers*, including verbal counting, object counting, number recognition, subitising (instantly recognizing the number of objects in a small group, without counting), number comparison, number sequencing, numeral recognition, number composition and decomposition, and adding and subtracting; and (b) *geometry*, including shape identification, shape composition and decomposition, comparison and congruence, construction of shapes and transformations; measurement; and pattern recognition. General concepts and processes such as part–whole thinking, and the corresponding processes of composition and decomposition, classification, and seriation are woven throughout several areas.

Dataset Preparation for Analysis of Direct Child Measures

Data cleaning. Preparing the data set proved to be a lengthy process with data cleaning accomplished in the following ways. First, from the total number of cases for each of the direct measures, 5% of the cases were randomly selected and all items dual–entered for quality assurance of initial data entry. For example, at the time of dual entry, 5% (n=47) of 931 PALS tests were randomly chosen and all items (in this case, 100 items per test x 47 cases = 4,700 items total) were re-entered into the database.

Secondly, all items on all measures were then analyzed statistically to determine whether the proper value range was entered or whether data were missing; subsequently, all files (i.e., children's individual tests) with potential anomalies were examined individually by hand, and, if necessary, the correct value was entered into the database. A log also was maintained to track the nature of all the changes made.

Imputation of missing values. In any dataset of this size, missing or invalid values occur for a

variety of reasons—some due to the test takers' refusal to answer questions, a data collector's error in recording a response or failure to administer an item, or errors made in data entry and/or cleaning. Whatever the reason, understanding the nature of missing data is important for analysis to ensure that the missing data pattern itself is not correlated with some unobserved factor related to the test item itself, but can be determined as "missing at random" (MAR) or "missing completely at random" (MCAR). For example, a person answering questions about drug use may refuse to answer an item which he/she feels might be incriminating; thus, missing values in this case would directly correlate with the item and affect any interpretation of the survey results since some portion of the targeted population of interest is not supplying answers.

In the present sample, it was concluded that the patterns of missing data were not significantly related to unobserved factors which would correlate significantly with the individual test items for which the values were unavailable. Therefore, we used a "multiple" imputation procedure to replace these missing values in the dataset for the statistical analyses. While "simple" imputation procedures replace the missing item with, for example, the value of the mean of that item across all cases, multiple imputation procedures calculate a range of the best possible values from multiple, randomly generated data sets; these values are then combined to produce the most accurate estimates of the missing values. The technical name of the multiple imputation procedure employed was *Markov Chain Monte Carlo*.[81]

Weighting procedures. In order to ensure that the analyses were representative of the kindergarten children in the state of Arizona in 2009, children's test scores were weighted in a ratio according to their proportional ethnic distribution in our sample compared to the proportions of ethnicity by county according to the Arizona Department of Education enrollments for 2009-2010. This resulted in a formula which gave undersampled sub-populations a higher weighting in calculating their performances and oversampled sub-populations a slightly lower weight. All analyses in the present report were done with the weighted scores for ethnic distribution.

APPENDIX B
AKRS DATA ANALYSIS AND TABLES

In order to better understand which demographic variables most influenced kindergarten readiness, a series of regressions were run. The regressions were run on each of the assessments given to the child as well as the teacher and guardian DECA survey. The child assessments can be divided into three broad categories: literacy, math and motor. Literacy is a combination of the PALS PreK assessment and the Preschool Language Assessment (PLS). The Pals PreK was divided into an additional four categories: alphabet knowledge, print awareness, rhyme awareness and name writing. The PLS was divided into three categories: auditory comprehension, expressive communication and total literacy. All PLS scores are reported in terms of standard scores. The total score is a combination of the auditory and expressive subscales combined.

The categories of math and motor are both only one broad score. Math is a total math proficiency score that is derived from the guardian survey. Guardians are asked a series of questions concerning their child's math abilities. They are asked to rate the child as proficient, in progress, not yet or don't know. These scores are then given a numeric value and comprise the variable of math proficiency. The child's motor score comes from the Battelle motor inventory. The motor score used in these regressions is the child's total motor raw score.

The final two dependent variables used were the guardian and teachers ratings for the *DECA* survey. The *DECA* is divided into four subsections: initiative, self-control, attachment and behavioral concern. Then the categories of initiative, self-control, and attachment are combined to create a measure called total protective factors. This creates five dependent variables for both the teacher and the guardian, making a total of ten dependent variables for the regressions. The ten *DECA* dependent variables along with the one motor, one math, and seven literacy variables create a grand total of eighteen dependent variables. There are nine independent variables used in these regression models: income, guardian education, gender, marital status, ethnicity, family size, free lunch, days in kindergarten and number of transition activities. These variables are explained in depth below.

The variable income comes from Part A of the guardian survey. Question ten asks, "What was the combined total income in 2008 for the HOUSEHOLD where the child lived? Options were; less than $5,000 and increased in $5,000 increments until reaching $50,000. For the purpose of analysis, theses options were collapsed into four options. Options ranged from 0-$15,000 and increased in $15,000 increments until reaching $50,000 or more. Coefficients should therefore be interpreted in relation to $15,000 gains in household income.

The variable guardian education also comes from Part A of the guardian survey. Question seven asks, "What is the highest grade or year of school you completed?" Options are as follows: 8^{th} grade or less, 9^{th}-12^{th} grade no diploma, GED, high school graduate, completed vocational, trade, or business school program, some college credit, associated degree (AA, AS), bachelor's degree (BA, BS, AB), master's degree (MA, MS, MSW, MBA), doctorate (PhD, EdD) or professional degree (MD, DDS, DVM, JD). For the purposes of analysis these were collapsed four categories. The four categories are; less than 8^{th} grade through HS no diploma, GED or HS diploma, vocational school/some college/AA, and any college degree. Additionally, to further understand this variable, a frequency was run on question four of the guardian survey. Question four reads, "What is your relationship to this child?" Choices were then mother/guardian (birthmother, foster, step, adoptive), father/guardian (birthfather, foster, step, adoptive), and other guardian (sit, sister, brother, in-law, aunt, uncle, cousin, grandparent, other family member, and other non-relative). Results from the frequency showed that 74% of the guardians were mothers, 22% fathers, and 4% other.

Child gender variable came from the guardian survey part A. Males were coded as zero and females were coded as one. In all regressions using this variable, the coefficient refers to the comparison between females and males. Therefore if a coefficient was 1.0, it would be interpreted as females are expected to score 1.0% higher than males on the assessment.

The marital status variable comes from question eight on the guardian survey part A. It reads, "What is your marital status?" Options are single, never married, married, separated, divorced and widowed. For the purposes of the regression these were collapsed into two categories: single parent homes and married homes. Single parent homes were coded as zero and married homes were coded as one. The coefficient for all regressions using this variable refers to the

comparison of married parents to that of single parents; therefore, a coefficient of 1.0 would be interpreted as children from married homes are expected to receive a score 1.0% higher than children from single parent homes.

The variable ethnicity comes from the guardian survey, question twenty-five. The question reads, "Is the child of Hispanic or Latino origin?" Children who were identified as non-Hispanic were coded as zero, and children who were identified as Hispanic were coded as one. In all regressions using this variable the coefficient should be interpreted as comparing Hispanic children to non-Hispanic children. Therefore a coefficient of 1.0 would be interpreted as Hispanic children are expected to receive a score 1.0% higher than non-Hispanic children.

The variable family size comes from the guardian survey part A. It is a combination of questions eleven and twelve. Question eleven reads, "How many adults 18 and older currently live in the same household as the child?" Question twelve reads, "Including the child, how many children under 18 currently live in the same household?" These two questions were combined to get the total number of people living in the same household as the child, including the child.

The variable free lunch comes from question fifteen on the guardian survey part A. The question reads, "Does the child receive free or reduced price lunches at school?" Choices consisted of "yes" or "no." In all regressions using this variable the coefficient should be interpreted as comparing children receiving free or reduced lunch to children not receiving free or reduced lunch. Therefore a coefficient of 1.0 would be interpreted as children receiving free or reduced lunch are expected to receive a score 1.0% higher than children not receiving free or reduced lunch.

The variable days in kindergarten was a variable calculated after all assessments were completed. The day that the child was assessed was subtracted from the start date of that child's school. This then created the variable for the number of days a child was in Kindergarten before they were assessed.

The variable number of transition activities comes from the guardian survey part A. Question twenty-four part A is a series of questions asking about the contact a child's family has had with the kindergarten teacher. Types of contact include the teacher visiting the child's home, the

teacher visiting the child's preschool, the teacher calling the family, the teacher sending a letter to the family, the teacher holding an open house and the teacher conducting a kindergarten readiness assessment on the child. For each of these options parents were asked to indicate if the transition activity took place before or after the first day of school. However, this variable does not take that into account. This variable counts all transition activities, regardless of when they took place.

The variable "approaches to learning" is comprised of several individual questions from the *DECA* and the teacher survey part B. The variable is measuring if children have a positive approach to learning. Questions pulled from the *DECA* measure; persistency, problem solving, trying new thing, attention, and decision making. Questions from the teacher survey include; curiosity about learning, decision making, attends to tasks, seeking help, and taking risks. There is a total of ten points possible on the measure. Children receiving a score of ten means that they do all of this things on a frequent bases, and are on track to developing positive approaches to learning.

One final set of independent variables were used in regression models run only for the dependent variable of math proficiency. They are called parental involvement. Parental involvement questions come from the guardian survey part A. Question 17 asks, "In a typical week, how often do you or someone in your family do the following things with the child?" The choices related to math are then, talk about size and weight of things, count, play sorting or matching games, play with toys or blocks to build things. The results of this regression can be seen in below.

All dependent variables were run in regression models with each individual independent variable. The results from these can be seen below. Coefficients, standard errors, significance and r-squared are reported for each regression model. In addition to running each model separately, models were run for each dependent variable with all of the independent variables included in the model. These models can be seen in appendix B. The r-squared for the entire model as well as the individual coefficients, standard errors and significances are reported for all of these models. A variance inflation factor was also run for these models to check for collinearity; none was found.

PHYSICAL HEALTH AND MOTOR DEVELOPMENT

Health Risks and Learning

	Coefficient	Std. Error	P Value	R Square
Alphabet Knowledge				
Overall Health	.975	.201	<0.001	.022
Health Risks	-1.049	.410	0.011	.009
Print Awareness				
Overall Health	.378	.076	<0.001	.023
Health Risks	-.828	.173	<0.001	.031
Rhyme Awareness				
Overall Health	.699	.106	<0.001	.041
Health Risks	-1.097	.241	<0.001	.028
Name				
Overall Health	.011	.006	0.087	.003
Health Risks	.001	.013	0.957	.000
PLS Auditory				
Overall Health	3.741	.522	<0.001	.048
Health Risks	-5.961	1.270	<0.001	.029
PLS Expressive				
Overall Health	3.059	.501	<0.001	.035
Health Risks	-4.370	1.227	<0.001	.017
PLS Total				
Overall Health	3.782	.525	<0.001	.017
Health Risks	-5.744	1.279	<0.001	.027
Math				
Overall Health	.948	.164	<0.001	.037
Health Risks	-1.818	.342	<0.001	.044

Motor and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*.401	.093	<0.001	.021
G. Education	*.365	.097	<0.001	.014
Gender	*1.032	.203	<0.001	.022
Marital Status	*.713	.211	.001	.011
Ethnicity	*-.627	.193	.001	.010
Family Size	*-.114	.054	.034	.004
Free Lunch Status	*-.610	.192	.002	.009
Days in K	*.018	.005	.001	.010
# of Trans. Activities	.025	.067	.714	.000
Language	*.401	.093	<0.001	.001

***SIGNIFICANT AT P=.05**

SOCIAL AND EMOTIONAL DEVELOPMENT

Teacher DECA Total Protective Factors and Learning Outcomes

	Coefficient	Std. Error	P Value	R-Squared
Alphabet Knowledge	*1.634	.267	<0.001	.032
Print Awareness	*.784	.103	<0.001	.049
Rhyme Awareness	*.924	.140	<0.001	.037
Name Writing	.002	.008	.798	.000
PLS Total	*5.664	.698	<0.001	.056
Math	*3.047	.213	<0.001	.181

***SIGNIFICANT AT P=.05**

Guardian DECA Total Protective Factors and Learning Outcomes

	Coefficient	Std. Error	P Value	R-Squared
Alphabet Knowledge	*1.399	.233	<0.001	.031
Print Awareness	*.653	.089	<0.001	.046
Rhyme Awareness	*1.002	.120	<0.001	.058
Name Writing	*.019	.007	.006	.007
PLS Total	*5.358	.603	<0.001	.065
Math	*1.479	.202	<0.001	.054

*SIGNIFICANT AT P=.05

APPROACHES TO LEARNING

Approaches to Learning and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*.155	.031	<0.001	.032
G. Education	*.091	.032	.005	.009
Gender	*.249	.062	<0.001	.017
Marital Status	*.295	.072	<0.001	.019
Ethnicity	-.104	.066	.113	.003
Family Size	-.022	.018	.212	.002
Free Lunch Status	*-.222	.062	<0.001	.013
Days in K	*.004	.002	.007	.008
# of Trans. Activities	.035	.021	.104	.005
Language	-.032	.085	.710	.000

*SIGNIFICANT AT P=.05

Approaches to Learning and Learning Outcomes

	Coefficient	Std. Error	P Value	R-Squared
Alphabet Knowledge	*1.153	.166	<0.001	.048
Print Awareness	*.495	.065	<0.001	.058
Rhyme Awareness	*.483	.089	<0.001	.030
Name Writing	*.012	.004	.010	.007
PLS Total	*2.028	.446	<0.001	.021
Math	*2.262	.119	<0.001	.284

***SIGNIFICANT AT P=.05**

LANGUAGE AND LITERACY

Alphabet Knowledge and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*1.211	.148	<0.001	.069
G. Education	*1.433	.152	<0.001	.080
Gender	.081	.304	.789	.000
Marital Status	*1.685	.340	<0.001	.023
Ethnicity	*-1.982	.307	<0.001	.039
Family Size	-.165	.086	.055	.004
Free Lunch Status	*-2.296	.301	<0.001	.051
Days in K	*.024	.008	.002	.008
# of Trans. Activities	*.274	.103	.008	.012
Language	*-2.404	.396	<0.001	.035

***SIGNIFICANT AT P=.05**

Print Awareness and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*.538	.055	<0.001	.095
G. Education	*.614	.057	<0.001	.101
Gender	.187	.117	.111	.002
Marital Status	*.845	.133	<0.001	.038
Ethnicity	*-.960	.120	<0.001	.059
Family Size	*-.131	.034	<0.001	.014
Free Lunch Status	*-1.151	.115	<0.001	.000
Days in K	.000	.003	.925	.000
# of Trans. Activities	.059	.042	.167	.003
Language	*-1.434	.151	<0.001	.082

***SIGNIFICANT AT P=.05**

Rhyme Awareness and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*.916	.074	<0.001	.148
G. Education	*1.041	.077	<0.001	.152
Gender	-.011	.159	.945	.000
Marital Status	*.804	.184	<0.001	.018
Ethnicity	*-1.927	.159	<0.001	.126
Family Size	*-.186	.046	<0.001	.015
Free Lunch Status	*-1.776	.155	<0.001	.107
Days in K	*-.009	.004	.032	.004
# of Trans. Activities	*.119	.060	.046	.007
Language	*-2.623	.199	<0.001	.148

***SIGNIFICANT AT P=.05**

Name Writing and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*.916	.074	<0.001	.148
G. Education	*1.041	.077	<0.001	.152
Gender	-.011	.159	.945	.000
Marital Status	*.804	.184	<0.001	.018
Ethnicity	*-1.927	.159	<0.001	.126
Family Size	*-.186	.046	<0.001	.015
Free Lunch Status	*-1.776	.155	<0.001	.107
Days in K	*-.009	.004	.032	.004
# of Trans. Activities	*.119	.060	.046	.007
Language	*-2.623	.199	<0.001	.148

***SIGNIFICANT AT P=.05**

PLS Total and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*3.275	.399	<0.001	.070
G. Education	*4.842	.402	<0.001	.124
Gender	.932	.801	.245	.001
Marital Status	*3.656	.937	<0.001	.015
Ethnicity	*-8.902	.818	<0.001	.103
Family Size	*-.915	.235	<0.001	.014
Free Lunch Status	*-8.541	.783	<0.001	.098
Days in K	*-.179	.020	<0.001	.067
# of Trans. Activities	.469	.304	.123	.004
Language	*-12.485	1.020	<0.001	.130

***SIGNIFICANT AT P=.05**

General Cognition and Knowledge

Math and Demographic Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	*1.103	.122	<0.001	.097
G. Education	*1.121	.126	<0.001	.097
Gender	*.693	.263	.009	.007
Marital Status	*1.319	.301	<0.001	.021
Ethnicity	*-1.804	.268	<0.001	.049
Family Size	*-.258	.076	.001	.013
Free Lunch Status	*-2.131	.259	<0.001	.068
Days in K	.012	.007	.080	.003
# of Trans. Activities	.163	.089	.068	.007
Language	*-2.839	.342	<0.001	.075

***SIGNIFICANT AT P=.05**

COVARIATES

Motor Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	.007	.197	.972	.142
G. Education	*.598	.205	.004	.142
Gender	*1.271	.273	<0.001	.142
Marital Status	.217	.396	.585	.142
Ethnicity	-.338	.341	.322	.142
Family Size	-.057	.092	.531	.142
Free Lunch Status	.230	.414	.579	.142
Days in K	*0.16	.007	.027	.142
# of Trans. Activities	.059	.072	.413	.142
Apps. to Learning	*1.315	.401	.001	.142
Language	-.184	.592	.756	.142

*SIGNIFICANT AT P=.05

Teacher DECA TPF Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	.285	.662	.667	.124
G. Education	1.204	.666	.071	.124
Gender	*3.566	.881	<0.001	.124
Marital Status	-1.907	1.251	.128	.124
Ethnicity	.112	1.081	.918	.124
Family Size	-.133	.284	.641	.124
Free Lunch Status	*-4.496	1.344	.001	.124
Days in K	*.053	.023	.022	.124
# of Trans. Activities	.434	.239	.070	.124
Language	1.705	1.680	.311	.124

*SIGNIFICANT AT P=.05

Guardian DECA TPF Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	-1.185	.736	.108	.117
G. Education	*2.500	.741	.001	.117
Gender	1.698	.980	.084	.117
Marital Status	-.947	1.392	.497	.117
Ethnicity	1.634	1.203	.175	.117
Family Size	-.015	.316	.962	.117
Free Lunch Status	*-4.287	1.496	.004	.117
Days in K	.033	.026	.197	.117
# of Trans. Activities	.299	.265	.261	.117
Language	-3.429	1.869	.067	.117

***SIGNIFICANT AT P=.05**

Alphabet Knowledge Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	-.047	.274	.863	.156
G. Education	*.870	.284	.002	.156
Gender	.564	.379	.138	.156
Marital Status	-.017	.550	.976	.156
Ethnicity	-.576	.473	.224	.156
Family Size	-.078	.127	.541	.156
Free Lunch Status	-.655	.575	.255	.156
Days in K	*.025	.010	.012	.156
# of Trans. Activities	.116	.100	.245	.156
Apps. To Learning	*1.882	.556	.001	.156
Language	-.918	.822	.264	.156

***SIGNIFICANT AT P=.05**

Print Awareness Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	.002	.111	.983	.278
G. Education	*.248	.116	.033	.278
Gender	*.468	.154	.003	.278
Marital Status	.178	.224	.427	.278
Ethnicity	.224	.192	.245	.278
Family Size	-.071	.052	.172	.278
Free Lunch Status	*-.536	.234	.023	.278
Days in K	*.014	.004	.001	.278
# of Trans. Activities	.013	.041	.758	.278
Apps. To Learning	*1.324	.226	<0.001	.278
Language	*-1.368	.334	<0.001	.278

***SIGNIFICANT AT P=.05**

Rhyme Awareness Characteristics

	Coefficient	Std. Error	P Value	R-Squared
Income	.168	.161	.297	.211
G. Education	*.626	.167	<0.001	.211
Gender	.152	.223	.497	.211
Marital Status	-.374	.324	.249	.211
Ethnicity	*-.795	.278	.004	.211
Family Size	.057	.075	.446	.211
Free Lunch Status	*-.733	.338	.031	.211
Days in K	.004	.006	.544	.211
# of Trans. Activities	-.014	.059	.810	.211
Apps. To Learning	.436	.327	.184	.211
Language	-.286	.483	.554	.211

***SIGNIFICANT AT P=.05**

Name Writing Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	.002	.009	.794	.019
G. Education	-.001	.009	.888	.019
Gender	-.006	.012	.603	.019
Marital Status	-.002	.017	.912	.019
Ethnicity	.009	.015	.537	.019
Family Size	.001	.004	.768	.019
Free Lunch Status	-.023	.018	.199	.019
Days in K	.000	.000	.373	.019
# of Trans. Activities	.001	.003	.870	.019
Apps. To Learning	.022	.018	.205	.019
Language	.006	.026	.803	.019

***SIGNIFICANT AT P=.05**

PLS Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	-1.353	.872	.121	.198
G. Education	*3.268	.905	<0.001	.198
Gender	1.684	1.208	.164	.198
Marital Status	1.068	1.752	.542	.198
Ethnicity	-2.586	1.506	.087	.198
Family Size	-.218	.404	.590	.198
Free Lunch Status	-2.218	1.831	.226	.198
Days in K	*-.093	.031	.003	.198
# of Trans. Activities	.027	.318	.933	.198
Apps. To Learning	*6.823	1.772	<0.001	.198
Language	*-5.519	2.616	.035	.198

***SIGNIFICANT AT P=.05**

Math Covariates

	Coefficient	Std. Error	P Value	R-Squared
Income	-.272	.224	.224	.379
G. Education	*.527	.223	.019	.379
Gender	*.899	.297	.003	.379
Marital Status	.170	.435	.696	.379
Ethnicity	.000	.373	.999	.379
Family Size	*-.219	.098	.026	.379
Free Lunch Status	*-.931	.460	.044	.379
Days in K	*.027	.008	<0.001	.379
# of Trans. Activities	.031	.078	.687	.379
Apps. to Learning	*4.668	.437	<0.001	.379
Language	*-1.586	.641	.014	.379

***SIGNIFICANT AT P=.05**

ENDNOTES

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